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DRINKING WATER SURVEILLANCE PROGRAM

**LONDON
(LAKE HURON)
WATER SUPPLY
SYSTEM**

REPORT FOR 1991 AND 1992

ISSN 0840-5271

**LONDON (LAKE HURON) WATER SUPPLY SYSTEM
DRINKING WATER SURVEILLANCE PROGRAM
REPORT FOR 1991 AND 1992**

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EXECUTIVE SUMMARY

DRINKING WATER SURVEILLANCE PROGRAM

LONDON (LAKE HURON) WATER SUPPLY SYSTEM 1991 AND 1992 REPORT

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to include all municipal supplies in Ontario. In 1991, 96 supplies and in 1992, 109 supplies were being monitored.

The London (Lake Huron) water treatment plant located at Grand Bend, is a conventional treatment plant which treats water from Lake Huron. The process consists of coagulation, flocculation, sedimentation, filtration and disinfection. Chlorine is added at the mouth of the intake structure for zebra mussel control when the raw water temperature is above 12°C. Treated water from this plant is pumped to the city of London where it is fluoridated at the Arva reservoir prior to distribution. This plant has a rated capacity of 145 x 1000 m³/day. The London (Lake Huron) water supply system serves a population of approximately 303,000.

Water at the plant, the Arva reservoir and at three locations in the distribution system was sampled for the presence of approximately 180 parameters. Parameters were divided into the following groups: bacteriological, inorganic and physical (laboratory chemistry, field chemistry and metals), organic (chloroaromatics, chlorophenols, pesticides and PCB, phenolics, polyaromatic hydrocarbons and volatiles) and radiological (radionuclides). Most laboratory analyses were conducted at the Ministry of the Environment and Energy facilities in Rexdale, Ontario. Radionuclides were analyzed by the Ministry of Labour.

Table A is a summary of all results by group.

No known health related guidelines were exceeded.

The London (Lake Huron) water supply system, for the sample years 1991 and 1992, produced good quality water and this was maintained in the distribution system.

TABLE A
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 LONDON (LAKE HURON) WSS

SUMMARY TABLE BY SCAN

A POSITIVE VALUE DENOTES THAT THE RESULT IS GREATER THAN THE STATISTICAL LIMIT OF DETECTION AND IS QUANTIFIABLE
A . . . INDICATES THAT NO SAMPLE WAS TAKEN

SCAN	SITE		RAW		ARVA RESERVOIR		TREATED		BROOKSIDE ST			
	TESTS	%POSITIVE	TESTS	%POSITIVE	TESTS	%POSITIVE	TESTS	%POSITIVE	TESTS	%POSITIVE		
BACTERIOLOGICAL	24	14	58	9	2	22	8	3	37	1	0	0
CHEMISTRY (FIELD)	30	30	100	47	47	100	60	59	98	10	10	100
CHEMISTRY (LABORATORY)	236	187	79	215	157	73	240	176	73	42	36	85
METALS	240	70	29	193	39	20	240	63	26	46	12	26
CHLOROAROMATICS	98	0	0	84	0	0	84	0	0	14	0	0
CHLOROPHENOLS	6	0	0	6	0	0	6	0	0	0	0	0
PESTICIDES AND PCB	257	0	0	222	0	0	235	0	0	22	0	0
PHENOLICS	10	1	10	8	0	0	10	1	10	0	0	0
POLYAROMATIC HYDROCARBONS	85	0	0	51	0	0	68	0	0	0	0	0
SPECIFIC PESTICIDES	29	0	0	20	0	0	28	0	0	0	0	0
VOLATILES	298	0	0	267	36	13	298	41	13	29	4	13
RADIONUCLIDES	14	4	28	7	2	28	14	4	28	0	0	0
TOTAL	1,327	306	1,129	283	1,291	347	1,291	164	62	62	62	62

TABLE A
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 LONDON (LAKE HURON) WSS

SUMMARY TABLE BY SCAN

A POSITIVE VALUE DENOTES THAT THE RESULT IS GREATER THAN THE STATISTICAL LIMIT OF DETECTION AND IS QUANTIFIABLE
A '-' INDICATES THAT NO SAMPLE WAS TAKEN

SCAN	SITE	RR#1 GRAND BEND		SURREY CT	
		TESTS	%POSITIVE	TESTS	%POSITIVE
BACTERIOLOGICAL		2	0	0	1
CHEMISTRY (FIELD)		18	18	15	100
CHEMISTRY (LABORATORY)		62	50	63	85
METALS		69	14	69	23
CHLOROBROMATICS		27	0	14	0
PESTICIDES AND PCB		44	0	22	0
POLYAROMATIC HYDROCARBONS		34	0	0	-
SPECIFIC PESTICIDES		1	0	0	-
VOLATILES		87	12	13	8
TOTAL		344	94	243	94

DRINKING WATER SURVEILLANCE PROGRAM
LONDON (LAKE HURON) WATER SUPPLY SYSTEM
1991 AND 1992 REPORT

INTRODUCTION

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to include all municipal supplies in Ontario. In 1991, 96 supplies and in 1992, 109 supplies were being monitored.

Appendix A has a full description of the DWSP.

The DWSP was initiated for the London (Lake Huron) water supply system in the spring of 1986. Previous annual reports have been published for 1986, 1987, 1988, 1989 and 1990.

PLANT DESCRIPTION

The London (Lake Huron) water treatment plant located at Grand Bend, is a conventional treatment plant which treats water from Lake Huron. The process consists of coagulation, flocculation, sedimentation, filtration and disinfection. Chlorine is added at the mouth of the intake structure for zebra mussel control when the raw water temperature is above 12°C. Treated water from this plant is pumped to the city of London where it is fluoridated at the Arva reservoir prior to distribution. This plant has a rated capacity of 145 x 1000 m³/day. The London (Lake Huron) water supply system serves a population of approximately 303,000.

The sample day flows ranged from 132 x 1000 m³/day to 232 x 1000 m³/day.

General plant information is presented in Table 1 and a schematic of plant processes, chemical addition points and sampling locations in Figure 1.

SAMPLING AND ANALYSES

Stringent DWSP sampling protocols were followed to ensure that all samples were collected in a uniform manner (see Appendix B).

Sample lines in the plant were flushed prior to sampling to ensure that the water obtained was indicative of its origin and not residual water standing in the sample line.

Attempts were made to capture the same block of water at each sampling point by taking the retention time into consideration. Retention time was calculated by dividing the volume of water between two sampling points by sample day flow. For example, if it was determined that retention time within the plant was five hours, then there would be a five hour interval between the raw and treated sampling. Similarly, if it was estimated that it took approximately one day for the water to travel from the plant to the distribution system site, this site would be sampled one day after the treated water from the plant.

To obtain a representative raw water sample, free from any added chemicals, at plants which used chlorine for zebra mussel control, the operator was required to turn off the chlorine feed to the mouth of the intake and allow enough time for the chlorinated water to clear from the intake works.

Plant operating personnel routinely analyzed parameters for process control (Table 2).

At all distribution system locations, two types of samples were obtained, a standing and a free flow. The standing sample consisted of water that had been in the household plumbing and service connection for a minimum of six hours. These samples were used to make an assessment of the change in the levels of inorganic compounds and metals due to leaching from, or deposition on, the plumbing system. The only analyses carried out on the standing samples, therefore, were laboratory chemistry and metals. The free flow sample represented fresh water from the distribution system main; since the sample tap was flushed for five minutes prior to sampling.

Water at the plant, the Arva reservoir and at three locations in the distribution system was sampled for the presence of approximately 180 parameters. Parameters were divided into the following groups: bacteriological, inorganic and physical (laboratory chemistry, field chemistry and metals), organic (chloroaromatics, chlorophenols, pesticides and PCB, phenolics, polyaromatic hydrocarbons and volatiles) and radiological (radionuclides). Most laboratory analyses were conducted at the Ministry of the Environment and Energy facilities in Rexdale, Ontario. Radionuclides were analyzed by the Ministry of Labour.

RESULTS

Field measurements were recorded on the day of sampling and were entered onto the DWSP database as submitted by plant personnel.

Table 3 contains information on delay time between the raw and treated water sampling, flow rate, and treatment chemical dosages.

Table 4 is a summary of all results by parameter and by water type. If a parameter was not detected, the total number of negative sample results is given. In contrast, if a parameter was detected at any location, the detailed results for all samples are provided.

Positive denotes that the result is greater than the statistical limit of detection established by the Ministry of the Environment and Energy laboratory staff and is quantifiable. Trace (<T) denotes that the level measured is greater than the lowest value detectable by the method but lies so close to the detection limit that it cannot be confidently quantified.

Table 5 lists all parameters analyzed in the DWSP.

Associated guidelines and detection limits are also supplied on Tables 4 and 5. Parameters are listed alphabetically within each scan.

DISCUSSION

GENERAL

Water quality was judged by comparison with the Ontario Drinking Water Objectives publication (ODWOs). These objectives are applied to the free flowing water. When an Ontario Drinking Water Objective (ODWO) was not available, guidelines/limits from other agencies were used. These guidelines were obtained from the Parameter Listing System database.

The guidelines are evaluated on the results from the free flowing samples. Standing samples in the distribution system can show elevated concentrations in certain metals if the water is corrosive or if the standing time is excessive. Flushing the tap until the water achieves the coolest temperature will ensure that the water used for consumption will contain minimum concentrations of metals.

IN THIS REPORT, DISCUSSION IS LIMITED TO:

- THE TREATED AND DISTRIBUTED WATER;
- ONLY THOSE PARAMETERS WITH CONCENTRATIONS ABOVE
GUIDELINE VALUES; AND
- POSITIVE ORGANIC PARAMETERS DETECTED.

BACTERIOLOGICAL

Guidelines for bacteriological sampling and testing of a supply are developed to maintain a proper supervision of its bacteriological quality. Routine monitoring programs usually require that multiple samples be collected in a given system. Full interpretation of bacteriological quality cannot be made on the basis of single samples. Standard plate count was the only bacteriological analysis conducted on the treated and distributed water.

Standard plate count is a test used to supplement routine analysis for coliform bacteria. The limit for standard plate count (at 35°C after 48 hours) in the ODWOs is 500 counts/mL (based on a geometric mean of 5 or more samples). DWSP bacteriological analysis of treated and distributed water was limited to standard plate count.

Standard plate count (membrane filtration) exceeded the ODWO Aesthetic Objective of 500 counts/mL in 1 of 22 treated and distributed water samples with a maximum reported value of >2,400 counts/mL.

INORGANIC & PHYSICAL

CHEMISTRY (FIELD)

It is desirable that the temperature of drinking water be less than 15°C. The palatability of water is enhanced by its coolness. A temperature below 15°C will tend to reduce the growth of nuisance organisms and hence minimize associated taste, colour, odour and corrosion problems. The temperature of delivered water may increase in the distribution system due to the warming effect of soil in late summer and fall and/or as a result of higher temperatures in the source water.

Field temperature exceeded the ODWO Aesthetic Objective of 15°C in 6 of 24 treated and distributed water samples with a maximum reported value of 21.0°C.

CHEMISTRY (LABORATORY)

The ODWOs indicate that a hardness level of between 80 and 100 mg/L as calcium carbonate for domestic waters provides an acceptable balance between corrosion and encrustation. Water supplies with a hardness greater than 200 mg/L are considered poor and possess a tendency to form scale deposits and result in excessive soap consumption.

Hardness exceeded the ODWO Recommended Operational Guideline of 80-100 mg/L in 20 of 25 treated and distributed water samples with a maximum reported value of 115.0 mg/L.

METALS

At present, there is no evidence that aluminum is physiologically harmful and no health limit for drinking water has been specified. The measure of aluminum in treated water is important to measure the efficiency of the treatment process. The ODWOs indicate that a useful guideline is to maintain a residual below 100 ug/L as aluminum in the water leaving the plant to avoid problems in the distribution system.

Aluminum exceeded the ODWO Recommended Operational Guideline of 100 ug/L in 11 of 24 treated and distributed water samples with a maximum reported value of 890.0 ug/L.

ORGANIC

CHLOROAROMATICS

The results of the chloroaromatic scan showed that none were detected above trace levels.

CHLOROPHENOLS

The results of the chlorophenol scan showed that none were detected.

PESTICIDES AND PCB

The results of the pesticide and PCB scan showed that none were detected above trace levels.

PHENOLICS

Phenolic compounds are present in the aquatic environment as a result of natural and/or industrial processes. The ODWOs have been revised to replace the aesthetic phenolic objective with objectives for specific phenols.

Phenolics were found at a positive level in 1 of the 18 treated and distributed water samples analyzed. The maximum observed level was 1.4 ug/L.

POLYAROMATIC HYDROCARBONS

The results of the polyaromatic hydrocarbon scan showed that none were detected.

SPECIFIC PESTICIDES

The results of the specific pesticide scan showed that none were detected.

VOLATILES

The detection of benzene, ethylbenzene, toluene and xylenes at low, trace levels may be a laboratory artifact derived from the analytical methodology. Trace levels of styrene are considered to be laboratory artifacts resulting from the sample shipping containers.

Trihalomethanes (THMs) are produced during the water treatment process and will always occur in chlorinated waters. THMs are

comprised of chloroform, chlorodibromomethane and dichlorobromomethane. Bromoform occurs occasionally. Results are reported for the individual compounds as well as for total THMs. Only total THM results are discussed. Starting in 1991, samples from the distribution system were quenched with sodium thiosulphate to stop the further production of THMs in the sample bottle. This provided a more representative estimation of the THMs consumed in tap water.

Total trihalomethanes were found at positive levels in all 25 treated and distributed water samples analyzed with a maximum level of 38.7 ug/L. This was below the ODWO Maximum Acceptable Concentration of 350 ug/L.

RADIOLOGICAL

RADIONUCLIDES

There are more than 200 radionuclides, some of which occur naturally and others which originate from the activities of society. The radionuclides currently of greater interest from a health view-point are tritium, strontium-90, iodine-131, cesium-137 and radium-226. The gross beta and gross alpha determinations are suitable for preliminary screening except for tritium which must be measured separately. Radionuclides are measured in becquerels per litre (Bq/L). No results were above the available guidelines.

CONCLUSIONS

No known health related guidelines were exceeded.

The London (Lake Huron) water supply system, for the sample years 1991 and 1992, produced good quality water and this was maintained in the distribution system.

FIGURE 1

LAKE HURON WATER SUPPLY SYSTEM

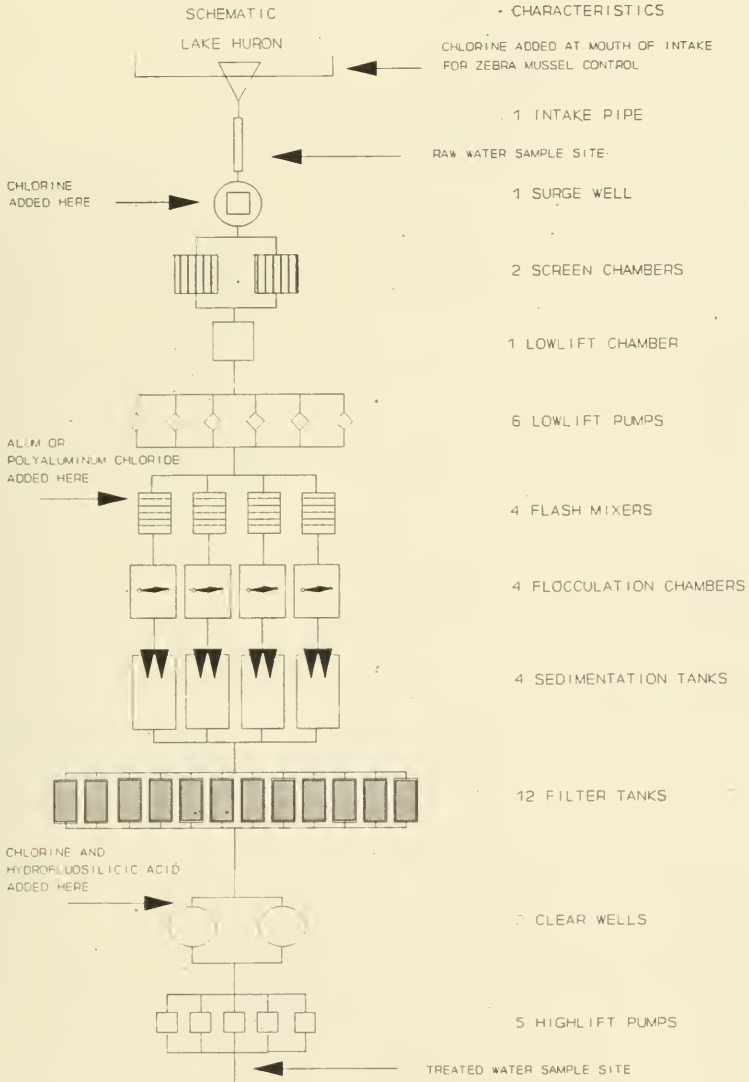


TABLE 1
DRINKING WATER SURVEILLANCE PROGRAM
PLANT GENERAL REPORT

PLANT NAME: LONDON (LAKE HURON) WSS
WORKS #: 210000791
UTM #: 174359204797200

DISTRICT: LONDON
REGION: SOUTHWEST
DISTRICT OFFICER: C. MURRAY

SUPERINTENDENT: AL SCOTT

ADDRESS: P.O. BOX 40
GRAND BEND, ONTARIO
NOM 1T0
519-238-8466

MUNICIPALITY: STEPHEN TOWNSHIP
AUTHORITY: PROVINCIAL

PLANT INFORMATION

PLANT VOLUME: 25.127 (X 1000 M3)
DESIGN CAPACITY: 345.502 (X 1000 M3/DAY)
RATED CAPACITY: 145.475 (X 1000 M3/DAY)

MUNICIPALITY	POPULATION	MUNICIPALITY	POPULATION
-----	-----	-----	-----
AILS A CRAIG	800	MCGILLVRA Y TWP	1,972
BOSANQUET TWP	700	PARKHILL	1,575
EAST WILLIAMS TWP	600	STANLEY TWP	600
GRAND BEND	700	STEPHEN TWP	5,686
HAY TWP	600	THEDFORD	600
LONDON	285,700	WEST WILLIAMS TWP	1,000
LONDON TWP	800		
LUCAN	1,740		

TABLE 2
DRINKING WATER SURVEILLANCE PROGRAM
IN-PLANT MONITORING

PARAMETER -----	LOCATION -----	FREQUENCY -----
ALGAE	LAB TREATED	WEEKLY
ALUMINUM	LAB TREATED	DAILY
FREE CHLORINE RESIDUAL	LAB TREATED	EVERY 4 HOURS
TOTAL CHLORINE RESIDUAL	LAB TREATED	EVERY 4 HOURS
PH	LAB RAW	EVERY 4 HOURS
	LAB TREATED	EVERY 4 HOURS
TEMPERATURE	RAW	CONTINUOUS
	TREATED	CONTINUOUS
TURBIDITY	LAB RAW	EVERY 4 HOURS
	FILTERED	CONTINUOUS
	TREATED	CONTINUOUS

TABLE 3
DRINKING WATER SURVEILLANCE PROGRAM LONDON (LAKE HURON) WSS SAMPLE DAY CONDITIONS
AND TREATMENT CHEMICAL DOSAGES FOR 1991 AND 1992

DATE	DELAY * TIME(HRS)	FLOW (1000M3)	PRE CHLORINATION CHLORINE	POST CHLORINATION CHLORINE	ALUM LIQUID	COAGULATION POLYALUMINUM CHLORIDE	FLUORIDATION HYDROFLUOSILICIC ACID
91 JAN 22	4.22	142.740	.	.70	16.00	.	1.00
91 MAR 18	4.24	142.390	.	1.00	12.00	.	.93
91 MAY 21	3.58	168.180	5.09	10.05	11.60	.	.
91 JUL 15	3.40	177.270	.	.81	11.50	.	1.00
91 SEP 17	2.59	232.000	.	.23	7.50	.	.87
91 NOV 20	4.28	140.910	.46	.82	4.60	.	1.00
92 MAR 17	4.12	146.250	.61	.82	18.10	.	.
92 JUN 15	3.79	159.000	.68	8.69	6.40	.	.
92 SEP 21	3.97	152.000	.	1.40	13.70	.	1.09
92 DEC 14	4.57	132.000	.	.	.	13.10	.

* THE DELAY TIME BETWEEN THE RAW AND TREATED WATER SAMPLING, SHOULD ESTIMATE THE RETENTION TIME.

KEY TO TABLE 4 and 5

- A ONTARIO DRINKING WATER OBJECTIVES (ODWO)
 1. Maximum Acceptable Concentration (MAC)
 1+. MAC for Total Trihalomethanes
 2. Interim Maximum Acceptable Concentration (IMAC)
 3. Aesthetic Objective (AO)
 3*. AO for Total Xylenes
 4. Recommended Operational Guideline
 5. Health Related Guidance Value
- B HEALTH & WELFARE CANADA (H&W)
 1. Maximum Acceptable Concentration (MAC)
 2. Proposed MAC
 3. Interim MAC
 4. Aesthetic Objective (AO)
- C WORLD HEALTH ORGANIZATION (WHO)
 1. Guideline Value (GV)
 2. Tentative GV
 3. Aesthetic GV
- D US ENVIRONMENTAL PROTECTION AGENCY (EPA)
 1. Maximum Contaminant Level (MCL)
 2. Suggested No-Adverse Effect Level (SNAEL)
 3. Lifetime Health Advisory
 4. EPA Ambient Water Quality Criteria
- F EUROPEAN ECONOMIC COMMUNITY (EEC)
 1. Health Related Guideline Level
 2. Aesthetic Guideline Level
 3. Maximum Admissable Concentration (MADC)
- G CALIFORNIA STATE DEPARTMENT OF HEALTH-GUIDELINE VALUE
- I NEW YORK STATE AMBIENT WATER GUIDELINE
- N/A NONE AVAILABLE

LABORATORY RESULTS, REMARK DESCRIPTIONS

. No Sample Taken

BDL Below Minimum Measurement Amount

<T Greater Than Detection Limit But Not Confident
(SEE INTERPRETATION OF RESULTS ABOVE)

> Results Are Greater Than The Upper Limit

<=> Approximate Result

!48 No Data: Sample Age Exceeded 48 Hours

!AR No Data: No Numeric Results

!AW No Data: Analysis Withdrawn

!BT No Data: Sample Broken In Transit

!CS No Data: Contamination Suspected

!EF No Data: Laboratory Equipment Failure

!IR No Data: Insufficient Sample

!IS No Data: Insufficient Sample

!LA No Data: Laboratory Accident

!NP No Data: No Procedure

!NR No Data: Sample Not Received

!OP No Data: Obscured Plate

!PE No Data: Procedure Error: Sample Discarded

!PR No Data: Preservative Required

!QU No Data: Quality Control Unacceptable

!RE No Data: Received Empty

!RO No Data: No Numeric Results

!SM No Data: Sample Missing

!SS No Data: Sample Improperly Preserved

!U No Data: Sample Unsuitable For Analysis

!UB No Data: Bottle Broken

!UN No Data: Result Unreliable

!UR	No Data: Unpreserved Sample Required
A	Approximate Value
A3C	Approximate, Total Count Exceeded 300 Colonies
A>	Approximate Value, Exceeded Normal Range
APS	Additional Peak, Less Than, Not Priority Pollutant
ARO	Additional Information In Laboratory Report
CRO	Calculated Result Only
NAF	Not All Required Tests Found
RID	Ioncal Calculated on Incomplete Data Set
RMP	P and M-Xylene Not Separated
RRR	Result Obtained by Repeat Analysis
RRV	Rerun Verification
SFA	Sample Filtered: Filtrate Analyzed
SIL	Sample Incorrectly Labelled
SPS	Several Peaks, Small, Not Priority Pollutant
U48	Unreliable: Sample Age Exceeded 48 Hours
UAL	Unreliable: Sample Age Exceeded Limit
UAU	Unreliable: Sample Age Unknown
UCS	Unreliable: Contamination Suspected
WSD	Wrong Sample Description On Bottle

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 LONDON (LAKE HURON) WSS

TREATMENT PLANT RAW	RESERVOIR ARVA	TREATMENT PLANT TREATED	DIST. SYSTEM BROOKSIDE ST FREE FLOW	DIST. SYSTEM BROOKSIDE ST STANDING	DIST. SYSTEM RR#1 GRAND BEND FREE FLOW	DIST. SYSTEM SURREY CT FREE FLOW	DIST. SYSTEM SURREY CT STANDING
BACTERIOLOGICAL							
FECAL COLIFORM MF (CT/100ML)		DET'N LIMIT = 0	GUIDELINE = 0 (A1)				
1991 JAN	BDL						
1991 MAR	BDL						
1991 JUL	2						
1991 NOV	BDL						
1992 MAR	4						
1992 JUN	BDL						
1992 SEP	9						
1992 DEC	0						
STANDARD PLATE CNT MF (CT/ML)							
1991 JAN		0 <=>					
1991 MAR		1 <=>					
1991 MAY		9 <=>			0 <=>		
1991 JUL		180			0 <=>		
1991 SEP		17			0 <=>		
1991 NOV		7 <=>				36	
1992 MAR		21		0 <=>		0 <=>	
1992 JUN		4 <=>					
1992 SEP		2400 >					
1992 DEC		3 <=>					
		4 <=>					
TOTAL COLIFORM MF (CT/100ML)							
1991 JAN	150 A3C						
1991 MAR	400						
1991 JUL	10 <=>						
1991 NOV	BDL						
1992 MAR	630 A3C						
1992 JUN	BDL						
1992 SEP	60 <=>						
1992 DEC	BDL						
T COLIFORM BCKGRD MF (CT/100ML)							
1991 JAN	8000 A3C						
1991 MAR	190						
1991 JUL	24000 >						
1991 NOV	5600 A3C						
1992 MAR	9200 A3C						
1992 JUN	6300 A3C						
1992 SEP	24000 >						
1992 DEC	1900						
GUIDELINE = N/A							

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 LONDON (LAKE HURON) WSS

TREATMENT PLANT RAW	RESERVOIR ARVA	TREATMENT PLANT TREATED	DIST. SYSTEM BROOKSIDE ST FREE FLOW	DIST. SYSTEM BROOKSIDE ST STANDING	DIST. SYSTEM RR#1 GRAND BEND FREE FLOW	DIST. SYSTEM SURREY CT FREE FLOW	DIST. SYSTEM SURREY CT STANDING
CHEMISTRY (FIELD)							
FLD CHLORINE (COMB) (MG/L)		DET'N LIMIT = 0	GUIDELINE = N/A				
1991 JAN	.300	.110					
1991 MAR	.100	.200			.010		
1991 MAY	.100	.100			.250		
1991 JUL	.100	.200			.200		
1991 SEP	.200	.020				.100	
1991 NOV	.300	.100	.300	.100		.100	.100
1992 JAN	.100	.100					
1992 JUN	.100	.100					
1992 SEP	.100	.000					
1992 DEC	.	.100					
FLD CHLORINE FREE (MG/L)		DET'N LIMIT = 0	GUIDELINE = N/A				
1991 JAN	.700	.990					
1991 MAR	.900	1.400			1.100		
1991 MAY	.900	1.000			.700		
1991 JUL	.900	1.000			.800		
1991 SEP	.700	.870				.200	
1991 NOV	.700	.900	.400	.200		.400	.200
1992 MAR	.900	.700					
1992 JUN	.600	.600					
1992 SEP	.900	1.000					
1992 DEC	.	.800					
FLD CHLORINE (TOTAL) (MG/L)		DET'N LIMIT = 0	GUIDELINE = N/A				
1991 JAN	1.000	1.100					
1991 MAR	1.000	1.600			1.200		
1991 MAY	1.000	1.100			.950		
1991 JUL	1.000	1.200			1.000		
1991 SEP	.900	.890				.300	
1991 NOV	1.000	1.000	.700	.300		.500	.300
1992 MAR	1.000	.800					
1992 JUN	.700	.700					
1992 SEP	1.000	1.000					
1992 DEC	.	.900					

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 LONDON (LAKE HURON) WSS

TREATMENT PLANT RAW	RESERVOIR ARVA	TREATMENT TREATED	DIST. SYSTEM BROOKSIDE ST FREE FLOW	DIST. SYSTEM BROOKSIDE ST STANDING	DIST. SYSTEM RR#1 GRAND BEND FREE FLOW	DIST. SYSTEM SURREY CT FREE FLOW	DIST. SYSTEM SURREY CT STANDING
CHEMISTRY (FIELD)							
FLD PH (OMNSLESS)	DET'N LIMIT = N/A		GUIDELINE = 6.5-8.5 (A4)				
1991 JAN	7.890	7.200	7.260	-	-	-	-
1991 MAR	8.080	7.200	7.470	-	7.470	-	-
1991 MAY	7.700	7.110	7.110	-	7.110	-	-
1991 JUL	8.110	7.600	7.220	-	7.220	-	-
1991 SEP	8.200	7.400	7.340	-	-	-	-
1991 NOV	7.300	7.530	7.530	-	-	7.400	-
1992 MAR	8.020	7.000	7.360	7.300	-	7.400	7.400
1992 JUN	7.680	7.900	7.600	-	-	-	-
1992 SEP	8.010	7.800	-	-	-	-	-
1992 DEC	7.900	7.890	-	-	-	-	-
FLD TEMPERATURE (DEG.C)							
1991 JAN	2.500	4.000	5.000	-	-	-	-
1991 MAR	1.900	1.900	1.900	-	5.000	-	-
1991 MAY	8.200	10.000	9.500	-	11.000	-	-
1991 JUL	10.000	13.800	10.000	-	15.000	-	-
1991 SEP	21.000	21.000	21.000	-	-	20.000	-
1991 NOV	7.200	7.000	6.000	13.000	-	16.000	20.000
1992 MAR	2.400	3.000	3.000	-	-	-	-
1992 JUN	11.000	12.500	11.000	-	-	-	-
1992 SEP	20.000	19.000	20.000	-	-	-	-
1992 DEC	6.000	-	6.000	-	-	-	-
FLD TURBIDITY (FTU)							
1991 JAN	3.800	.990	.120	-	-	-	-
1991 MAR	2.200	-	.150	-	.150	-	-
1991 MAY	3.500	-	.040	-	.040	-	-
1991 JUL	2.200	1.000	.110	-	.110	-	-
1991 SEP	1.800	-	.100	-	-	-	-
1991 NOV	1.600	1.000	.100	-	-	-	-
1992 MAR	10.200	-	.120	-	-	-	-
1992 JUN	1.900	-	.140	-	-	-	-
1992 SEP	4.600	-	.090	-	-	-	-
1992 DEC	.940	-	.080	-	-	-	-

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 LONDON (LAKE HURON) WSS

TREATMENT PLANT RAW	RESERVOIR ARVA	TREATMENT PLANT TREATED	DIST. SYSTEM BROOKSIDE ST FREE FLOW	DIST. SYSTEM BROOKSIDE ST STANDING	DIST. SYSTEM RR#1 GRAND BEND FREE FLOW	DIST. SYSTEM SURREY CT FREE FLOW	DIST. SYSTEM SURREY CT STANDING
CHEMISTRY (LABORATORY)							
ALKALINITY (MG/L)			DET'N LIMIT = 0.2				
			GUIDELINE = 30-500 (A4)				
1991 JAN	86,600	78,000	77,600	-	-	-	-
1991 MAR	90,600	82,600	84,500	-	83,600	-	-
1991 MAY	88,600	81,000	79,600	-	81,300	-	-
1991 JUL	88,000	78,000	81,400	-	78,100	-	-
1991 SEP	86,900	79,600	81,600	-	-	82,700	-
1991 NOV	85,200	78,800	81,500	80,000	80,300	80,900	81,400
1992 MAR	92,900	79,600	82,800	-	-	-	-
1992 JUN	85,800	79,200	82,300	-	-	-	-
1992 SEP	88,600	82,000	84,600	-	-	-	-
1992 DEC	84,300	-	81,400	-	-	-	-
CALCIUM (MG/L)			DET'N LIMIT = 0.20				
			GUIDELINE = 100 (F2)				
1991 JAN	30,100	30,900	30,300	-	-	-	-
1991 MAR	30,400	29,900	30,300	-	30,200	-	-
1991 MAY	31,400	31,600	30,400	-	31,800	-	-
1991 JUL	30,200	30,400	30,600	-	30,200	-	-
1991 SEP	29,200	28,300	28,200	-	-	32,200	-
1991 NOV	28,300	26,900	28,200	28,200	-	28,100	28,200
1992 MAR	32,000	32,400	32,100	-	-	-	-
1992 JUN	27,300	27,300	27,000	-	-	-	-
1992 SEP	29,250	29,100	30,050	-	-	-	-
1992 DEC	27,750	-	27,600	-	-	-	-
CYANIDE (MG/L)			DET'N LIMIT = 0.001				
			GUIDELINE = 0.2 (A1)				
25 SAMPLES			BOL				
			BOL				
CHLORIDE (MG/L)			DET'N LIMIT = 0.20				
			GUIDELINE = 250 (A3)				
1991 JAN	7,200	6,400	6,500	-	-	-	-
1991 MAR	6,100	7,300	7,300	-	7,200	-	-
1991 MAY	5,700	7,500	7,000	-	7,100	-	-
1991 JUL	6,100	7,400	7,200	-	7,500	-	-
1991 SEP	5,900	7,300	7,300	-	-	7,400	-
1991 NOV	6,000	6,900	6,700	6,900	6,900	6,900	7,200
1992 MAR	7,000	8,000	7,600	-	-	-	-
1992 JUN	5,900	7,300	6,600	-	-	-	-
1992 SEP	6,500	8,000	7,600	-	-	-	-
1992 DEC	6,200	-	7,000	-	-	-	-

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 LONDON (LAKE HURON) WSS

TREATMENT PLANT RAW	RESERVOIR ARVA	TREATMENT PLANT TREATED	DIST. SYSTEM BROOKSIDE ST FREE FLOW	DIST. SYSTEM BROOKSIDE ST STANDING	DIST. SYSTEM R#1 GRAND BEND FREE FLOW	DIST. SYSTEM SURREY CT FREE FLOW	DIST. SYSTEM SURREY CT STANDING
CHEMISTRY (LABORATORY)							
COLOUR (HZU)	DET'N LIMIT = 0.50		GUIDELINE = 5 (A3)				
1991 JAN	.500 <T	BDL					
1991 MAR	1.000 <T	.500 <T			BDL		
1991 MAY	1.000 <T	.500 <T			BDL		
1991 JUL	1.000 <T	.500 <T			BDL		
1991 SEP	.500 <T	BDL				.500 <T	
1991 NOV	BDL	BDL	BDL				BDL
1992 MAR	BDL	.500 <T					
1992 JUN	.500 <T	BDL					
1992 SEP	BDL	BDL					
1992 DEC	1.000 <T	.500 <T					
CONDUCTIVITY (UMHO/CM)							
	DET'N LIMIT = 1.0		GUIDELINE = 400 (F2)				
1991 JAN	214	226					
1991 MAR	228	232			231		
1991 MAY	213	216			217		
1991 JUL	219	222			223		
1991 SEP	220	221				227	
1991 NOV	216	218	218			219	219
1992 MAR	241	246					
1992 JUN	216	219					
1992 SEP	223	234					
1992 DEC	217	225					
DISS ORG CARBON (MG/L)							
	DET'N LIMIT = 0.10		GUIDELINE = 5.0 (A3)				
1991 JAN	1.500	1.200					
1991 MAR	1.800	1.500			1.400		
1991 MAY	1.500	1.500			1.300		
1991 JUL	1.300	1.100			1.000		
1991 SEP	1.700	1.400				1.900	
1991 NOV	1.500	1.500	1.500			1.500	1.700
1992 MAR	1.600	1.200					
1992 JUN	1.100	1.000					
1992 SEP	1.700	1.600					
1992 DEC	1.300	1.200					

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 LONDON (LAKE HURON) WSS

TREATMENT PLANT RAW	RESERVOIR ARVA	TREATMENT PLANT .TREATED	DIST. SYSTEM BROOKSIDE ST FREE FLOW	DIST. SYSTEM BROOKSIDE ST STANDING	DIST. SYSTEM RR#1 GRAND BEND FREE FLOW	DIST. SYSTEM SURREY CT FREE FLOW	DIST. SYSTEM SURREY CT STANDING
CHEMISTRY (LABORATORY)							
FLUORIDE (MG/L)			DET'N LIMIT = 0.01		GUIDELINE = 1.5 (A1)		
1991 JAN	.080	.760	.060	.	.	.	.
1991 MAR	.080	.940	.080	.	.	.080	.
1991 MAY	.060	.820	.060	.	.	.040 <T	.
1991 JUL	.080	.880	.060	.	.	.060	.
1991 SEP	.080	.940	.080	.	.	.	.940
1991 NOV	.080	1.340	.080	.980	.840	.780	.820
1992 MAR	.080	1.080	.080	.	.	.	.
1992 JUN	.060	1.100	.080	.	.	.	.
1992 SEP	.080	1.160	.100	.	.	.	.
1992 DEC	.100	.	.100	.	.	.	.
HARDNESS (MG/L)			DET'N LIMIT = 0.5		GUIDELINE = 80-100 (A4)		
1991 JAN	106.600	107.300	106.400	.	.	.	.
1991 MAR	107.800	105.200	107.600	.	.	105.300	.
1991 MAY	110.000	111.000	107.000	.	.	111.000	.
1991 JUL	107.000	107.000	107.000	.	.	106.000	.
1991 SEP	105.200	102.500	102.500	.	.	.	111.900
1991 NOV	100.400	95.700	100.000	101.000	99.900	99.700	99.600
1992 MAR	115.000	115.000	115.000	.	.	.	.
1992 JUN	99.000	99.000	99.000	.	.	.	.
1992 SEP	105.550	105.520	108.190	.	.	.	.
1992 DEC	100.230	.	99.750	.	.	.	.
IONCAL (DNMSLESS)			DET'N LIMIT = N/A		GUIDELINE = N/A		
1991 JAN	1.052	3.384	1.859	.	.	.	.
1991 MAR	1.616 NAF	2.953 NAF	2.527 NAF	.	.	2.842 NAF	.
1991 MAY	4.150 NAF	3.381 NAF	2.670 NAF	.	.	3.831 NAF	.
1991 JUL	.755	1.628	.558	.	.	.069	.
1991 SEP	.111 NAF	1.093 NAF	3.049 NAF	.	.	.	5.763 NAF
1991 NOV	.582 NAF	4.065 NAF	1.285 NAF	.904 NAF	1.436 NAF	.	.209 NAF
1992 MAR	1.061	3.423	1.289	.	.	.	.
1992 JUN	3.706 NAF	1.528 NAF	3.467 NAF	.	.	.	.
1992 SEP	1.097	1.116	1.545	.	.	.	.
1992 DEC	1.717	.	1.721	.	.	.	.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 LONDON (LAKE HURON) WSS

TREATMENT PLANT RAW	RESERVOIR ARVA	TREATMENT PLANT TREATED	DIST. SYSTEM BROOKSIDE ST. FREE FLOW	DIST. SYSTEM BROOKSIDE ST. STANDING	DIST. SYSTEM RR#1 GRAND BEND FREE FLOW	DIST. SYSTEM SURREY CT FREE FLOW	DIST. SYSTEM SURREY CT STANDING
CHEMISTRY (LABORATORY)							
POTASSIUM (MG/L)			DET'N LIMIT = 0.01				
			GUIDELINE = 10 (F2)				
1991 JAN	.990	1.010	.980	.	.	.	.
1991 MAR	.910	.950	.950	.	.950	.	.
1991 MAY	.850	.850	.900	.	.850	.	.
1991 JUL	.900	.900	.900	.	.900	.	.
1991 SEP	1.010	.990	1.010	.	.	1.100	.
1991 NOV	.860	.820	.850	.860	.810	.830	.880
1992 MAR	1.210	1.020	1.070	.	.	.	.
1992 JUN	.930	.970	.910	.	.	.	.
1992 SEP	1.020	1.020	1.026	.	.	.	.
1992 DEC	.919	.	.907	.	.	.	.
LANGELIERS INDEX (OMNILESS)							
			DET'N LIMIT = N/A				
			GUIDELINE = N/A				
1991 JAN	.301	.102	.102	.	.	.	.
1991 MAR	.289	.150	.175	.	.170	.	.
1991 MAY	.269	.010	.107	.	.004	.	.
1991 JUL	.227	.036	.058	.	.074	.	.
1991 SEP	.307	.174	.163	.	.	.255	.083
1991 NOV	.256	.009	.115	.072	.048	.079	.
1992 MAR	.387	.026	.107	.	.	.	.
1992 JUN	.333	.137	.230	.	.	.	.
1992 SEP	.305	.154	.223	.	.	.	.
1992 DEC	.132	.	.002	.	.	.	.
MAGNESIUM (MG/L)			DET'N LIMIT = 0.1				
			GUIDELINE = 30.0 (F2)				
1991 JAN	7.650	7.350	7.500	.	.	.	.
1991 MAR	7.750	7.400	7.750	.	7.300	.	.
1991 MAY	7.600	7.700	7.600	.	7.600	.	.
1991 JUL	7.600	7.400	7.400	.	7.300	.	.
1991 SEP	7.800	7.800	7.850	.	.	7.650	.
1991 NOV	7.200	6.950	7.200	7.200	7.200	7.150	7.150
1992 MAR	8.420	8.310	8.360	.	.	.	.
1992 JUN	7.490	7.560	7.530	.	.	.	.
1992 SEP	7.900	7.970	8.050	.	.	.	.
1992 DEC	7.510	.	7.490	.	.	.	.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 LONDON (LAKE HURON) WSS

TREATMENT PLANT RAW	RESERVOIR ARVA	TREATMENT PLANT TREATED	DIST. SYSTEM BROOKSIDE ST FREE FLOW	DIST. SYSTEM BROOKSIDE ST STANDING	DIST. SYSTEM RR#1 GRAND BEND FREE FLOW	DIST. SYSTEM SURREY CT FREE FLOW	DIST. SYSTEM SURREY CT STANDING
CHEMISTRY (LABORATORY)							
SODIUM (MG/L)			DET'N LIMIT = 0.20	GUIDELINE = 200 (A4)			
1991 JAN	3.800	3.500					
1991 MAR	3.700	3.800			3.800		
1991 MAY	3.800	3.800			3.800		
1991 JUL	3.400	3.400			3.600		
1991 SEP	3.300	3.400				3.400	
1991 NOV	3.400	3.200	3.300	3.400		3.400	3.500
1992 MAR	4.200	4.130					
1992 JUN	3.690	3.660					
1992 SEP	3.590	5.410					
1992 DEC	3.560	5.210					
AMMONIUM TOTAL (MG/L)			DET'N LIMIT = 0.002	GUIDELINE = 0.05 (F2)			
1991 JAN	BOL	BOL					
1991 MAR	.002 <T	BOL			BOL		
1991 MAY	.010	BOL			BOL		
1991 JUL	.028	.010			.008 <T		
1991 SEP	.004 <T	.004 <T				.004 <T	
1991 NOV	.002 <T	BOL	BOL	BOL		BOL	.008 <T
1992 MAR	.002 <T	.002 <T					
1992 JUN	.008 <T	.004 <T					
1992 SEP	.004 <T	BOL					
1992 DEC	.010	BOL					
NITRITE (MG/L)			DET'N LIMIT = 0.001	GUIDELINE = 1.0 (A1)			
1991 JAN	BOL	BOL					
1991 MAR	.002 <T	BOL			BOL		
1991 MAY	.002 <T	BOL			BOL		
1991 JUL	.002 <T	BOL					
1991 SEP	.003 <T	BOL				.002 <T	
1991 NOV	.001 <T	BOL	BOL	BOL		BOL	BOL
1992 MAR	.005	.001 <T					
1992 JUN	.003 <T	BOL					
1992 SEP	.004 <T	BOL					
1992 DEC	.001 <T	BOL					

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 LONDON (LAKE HURON) WSS

TREATMENT PLANT RAW	RESERVOIR ARVA	TREATMENT PLANT TREATED	DIST. SYSTEM BROOKSIDE ST FREE FLOW	DIST. SYSTEM BROOKSIDE ST STANDING	DIST. SYSTEM RR#1 GRAND BEND FREE FLOW	DIST. SYSTEM SURREY CT FREE FLOW	DIST. SYSTEM SURREY CT STANDING
CHEMISTRY (LABORATORY)							
NITRATE (TOTAL) (MG/L)			GUIDELINE = 10.0 (A1)				
DET'N LIMIT = 0.005							
1991 JAN	.390	.385	.380	.	.	.	.
1991 MAR	.550	.575	.580	.	.540	.	.
1991 MAY	.370	.410	.375	.	.385	.	.
1991 JUL	.310	.310	.310	.	.310	.	.
1991 SEP	.270	.280	.275	.	.	.275	.
1991 NOV	.285	.285	.290	.295	.	.280	.285
1992 MAR	.785	.740	.765	.	.	.	.
1992 JUN	.350	.325	.350	.	.	.	.
1992 SEP	.375	.375	.375	.	.	.	.
1992 DEC	.310	.	.310	.	.	.	.
NITROGEN TOT KJELD (MG/L)			GUIDELINE = N/A				
DET'N LIMIT = 0.02							
1991 JAN	.210	.080 <T	.070 <T	.	.	.	.
1991 MAR	.150	.090 <T	.090 <T	.	.090 <T	.	.
1991 MAY	.360	.080 <T	.120	.	.100	.	.
1991 JUL	.230	.110	.110	.	.130	.	.
1991 SEP	.150	.060 <T	.100	.	.	.100	.
1991 NOV	.140	.110	.130	.110	.	.100	.170
1992 MAR	.180	.100	.100	.	.	.	.
1992 JUN	.150	.110	.110	.	.	.	.
1992 SEP	.180	.140	.130	.	.	.	.
1992 DEC	.190	.100	.100	.	.	.	.
PH (DIMENSIONLESS)			GUIDELINE = 6.5-8.5 (A4)				
DET'N LIMIT = N/A							
1991 JAN	8.290	8.130	8.140	.	.	.	.
1991 MAR	8.260	8.170	8.180	.	8.180	.	.
1991 MAY	8.230	8.010	8.130	.	7.990	.	.
1991 JUL	8.210	8.070	8.070	.	8.110	.	.
1991 SEP	8.310	8.230	8.210	.	.	8.240	.
1991 NOV	8.280	8.090	8.160	8.120	8.100	8.130	8.130
1992 MAR	8.330	7.980	8.100
1992 JUN	8.370	8.210	8.290
1992 SEP	8.300	8.190	8.230
1992 DEC	8.170	.	8.060

TABLE 4
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TREATMENT PLANT RAW	RESERVOIR ARVA	TREATMENT PLANT TREATED	DIST. SYSTEM BROOKSIDE ST FREE FLOW	DIST. SYSTEM BROOKSIDE ST STANDING	DIST. SYSTEM RR#1 GRAND BEND FREE FLOW	DIST. SYSTEM SURREY CT FREE FLOW	DIST. SYSTEM SURREY CT STANDING
CHEMISTRY (LABORATORY)			GUIDELINE = N/A				
PHOSPHORUS FIL REACT (MG/L)			DET'N LIMIT = 0.0005				
1991 JAN	BDL	.002 <T	BDL	.	.	.	.
1991 MAR	.001 <T	.005	BDL	.	.	.	.
1991 MAY	.000 <T	.001 <T	BDL	.	.	.	.
1991 JUL	.001 <T	.000 <T	BDL	.	.	.	.
1991 SEP	.000 <T	.000 <T	BDL	.	.	.	.
1991 NOV	.000 <T	.001 <T	BDL	.	.	.	.
1992 MAR	.003 <T	.001 <T	.001 <T	.	.	.	.
1992 JUN	BDL	.001 <T	BDL	.	.	.	.
1992 SEP	BDL	.002 <T	BDL	.	.	.	.
1992 DEC	.001 <T	.	BDL	.	.	.	.
PHOSPHORUS TOTAL (MG/L)			DET'N LIMIT = 0.002	GUIDELINE = 0.40 (F2)			
1991 JAN	.014	.004 <T	BDL	.	.	.	.
1991 MAR	.008 <T	.007 <T	.002 <T	.	.	.	.
1991 MAY	.008 <T	BDL	BDL	.	.	.	.
1991 JUL	.011	.002 <T	.002 <T	.	.	.	.
1991 SEP	.004 <T	BDL	.002 <T	.	.	.	.
1991 NOV	.005 <T	.002 <T	.003 <T	.	.	.	.
1992 MAR	.014	.002 <T	.002 <T	.	.	.	.
1992 JUN	.006 <T	.003 <T	.004 <T	.	.	.	.
1992 SEP	.005 <T	BDL	.002 <T	.	.	.	.
1992 DEC	.006 <T	.	.002 <T	.	.	.	.
RESIDUE FILTRATE (MG/L)			DET'N LIMIT = N/A	GUIDELINE = 500 (A3)			
1991 JAN	139.000 CRO	147.000 CRO	146.000 CRO	.	.	.	.
1991 MAR	148.000 CRO	151.000 CRO	151.000 CRO	.	150.000 CRO	.	.
1991 MAY	138.000 CRO	144.000 CRO	140.000 CRO	.	141.000 CRO	.	.
1991 JUL	142.000 CRO	146.000 CRO	146.000 CRO	.	145.000 CRO	.	.
1991 SEP	143.000 CRO	144.000 CRO	144.000 CRO	.	.	148.000 CRO	142.000 CRO
1991 NOV	140.000 CRO	142.000 CRO	141.000 CRO	142.000 CRO	.	142.000 CRO	.
1992 MAR	157.000 CRO	160.000 CRO	159.000 CRO	.	.	.	.
1992 JUN	140.000 CRO	142.000 CRO	142.000 CRO
1992 SEP	145.000 CRO	152.000 CRO	151.000 CRO
1992 DEC	141.000	.	146.000

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TREATMENT PLANT RAW	RESERVOIR ARVA	TREATMENT PLANT TREATED	DIST. SYSTEM BROOKSIDE ST FREE FLOW	DIST. SYSTEM BROOKSIDE ST STANDING	DIST. SYSTEM RR#1 GRAND BEND FREE FLOW	DIST. SYSTEM SURREY CT FREE FLOW	DIST. SYSTEM SURREY CT STANDING
CHEMISTRY (LABORATORY)							
SULPHATE (MG/L)			DET'N LIMIT = 0.20	GUIDELINE = 500 (A3)			
1991 JAN	16.070	23.090	24.720	.	.	.	.
1991 MAR	16.970	21.840	22.360	.	21.560	.	.
1991 MAY	15.650	22.030	21.800	.	21.970	.	.
1991 JUL	16.030	22.570	22.450	.	23.720	.	.
1991 SEP	16.420	20.630	20.790	.	.	19.160	.
1991 NOV	14.090	17.670	17.170	15.180	.	15.930	16.040
1992 MAR	17.540	26.560	26.000	.	.	.	.
1992 JUN	16.110	18.870	17.700	.	.	.	.
1992 SEP	16.080	21.670	21.770	.	.	.	.
1992 DEC	16.150	20.880	.	.	.	.	.
TURBIDITY (FTU)			DET'N LIMIT = 0.05	GUIDELINE = 1.0 (A1)			
1991 JAN	6.300	.960	.570	.	.300	.	.
1991 MAR	2.200	.690	.550	.	.200 <T	.	.
1991 MAY	1.450	.740	.230 <T	.	.190	.	.
1991 JUL	1.400	.150	.490	.	.	.190	.
1991 SEP	1.750	.370	.330	.	.	.300	.470
1991 NOV	1.410	.300	.280	.340	.	.	.
1992 MAR	13.100	.230 <T	.200 <T
1992 JUN	1.050	.290	.340
1992 SEP	4.200	.360	.340
1992 DEC	.850	.	.170 <T

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METALS						
SILVER (UG/L)						
36 SAMPLES	BOL	BOL	BOL	BOL	BOL	BOL
ALUMINUM (UG/L)						
1991 JAN	44.000	29.000				
1991 MAR	27.000	890.000				
1991 MAY	36.000	150.000			95.000	
1991 JUL	23.000	56.000			54.000	
1991 SEP	29.000	100.000			86.000	
1991 NOV	13.000	270.000				210.000
1991 DEC	98.000	110.000	100.000	100.000		110.000
1992 JAN	27.000	130.000			100.000	
1992 FEB	11.000	36.000				
1992 MAR	130.000	240.000				
1992 APR	45.000	130.000				
1992 MAY	12.000	47.000				
ARSENIC (UG/L)						
1991 JAN	1.000 <T	.770 <T				
1991 MAR	.740 <T	1.600			.390 <T	
1991 MAY	.440 <T	.190 <T			BOL	
1991 JUL	.610 <T	.470 <T			.350 <T	
1991 SEP	.440 <T	.710 <T				.590 <T
1991 NOV	.650 <T	.550 <T		.420 <T	.390 <T	.470 <T
1992 JAN	.130 <T	BOL				
1992 JUN	.210 <T	BOL				
1992 SEP	.540 <T	.730 <T				
1992 DEC	.770 <T	.280 <T				
BARIUM (UG/L)						
1991 JAN	15.000	14.000				
1991 MAR	14.000	14.000			13.000	
1991 MAY	14.000	13.000			13.000	
1991 JUL	13.000	13.000				
1991 SEP	15.000	15.000				15.000
1991 NOV	14.000	14.000	14.000	15.000	15.000	16.000
1992 JAN	16.000	15.000				
1992 JUN	16.000	16.000				
1992 SEP	15.000	15.000				
1992 DEC	15.000	14.000				

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BORON (UG/L)							
			DET'N LIMIT = 2.00				
			GUIDELINE = 5000 (A1)				
1991 JAN	17,000 <T	16,000 <T	16,000 <T
1991 MAR	14,000 <T	12,000 <T	12,000 <T	.	14,000 <T	.	.
1991 MAY	13,000 <T	13,000 <T	13,000 <T	.	13,000 <T	.	.
1991 JUL	12,000 <T	13,000 <T	13,000 <T	.	13,000 <T	.	.
1991 SEP	14,000 <T	14,000 <T	15,000 <T	.	.	14,000 <T	.
1991 NOV	18,000 <T	13,000 <T	13,000 <T	13,000 <T	.	12,000 <T	14,000 <T
1991 DEC	11,000 <T	11,000 <T	12,000 <T	.	.	.	.
1992 JAN	12,000 <T	IMP	13,000 <T	.	.	.	.
1992 FEB	16,000 <T	16,000 <T	16,000 <T	.	.	.	.
1992 MAR	13,000 <T	15,000 <T	15,000 <T	.	.	.	.
BERYLLIUM (UG/L)							
			DET'N LIMIT = 0.05				
			GUIDELINE = 6800 (D4)				
1991 JAN	BDL	BDL	BDL	.	.	.	.
1991 MAR	BDL	BDL	BDL	.	BDL	.	.
1991 MAY	BDL	BDL	BDL	.	BDL	.	.
1991 JUL	BDL	BDL	BDL	.	BDL	.	.
1991 SEP	BDL	BDL	BDL	.	.	.070 <T	.
1991 NOV	BDL	BDL	BDL	BDL	.	BDL	BDL
1992 JAN	BDL	BDL	BDL	.	.	.	.
1992 FEB	BDL	IMP	.100 <T	.	.	.	.
1992 MAR	BDL	BDL	BDL	.	.	.	.
1992 APR	BDL	BDL	BDL	.	.	.	.
1992 MAY	BDL	BDL	BDL	.	.	.	.
1992 JUN	BDL	BDL	BDL	.	.	.	.
1992 JUL	BDL	BDL	BDL	.	.	.	.
1992 AUG	BDL	BDL	BDL	.	.	.	.
1992 SEP	BDL	BDL	BDL	.	.	.	.
1992 OCT	BDL	BDL	BDL	.	.	.	.
1992 NOV	BDL	BDL	BDL	.	.	.	.
1992 DEC	BDL	BDL	BDL	.	.	.	.
CADMIUM (UG/L)							
			DET'N LIMIT = 0.05				
			GUIDELINE = 5.0 (A1)				
1991 JAN	BDL	BDL	BDL	.	.	.	.
1991 MAR	BDL	BDL	BDL	.	BDL	.	.
1991 MAY	BDL	BDL	BDL	.	BDL	.	.
1991 JUL	BDL	BDL	BDL	.	BDL	.	.
1991 SEP	BDL	BDL	BDL	.	.	BDL	.
1991 NOV	BDL	BDL	BDL	BDL	.	BDL	.060 <T
1992 JAN	BDL	BDL	BDL	.	.	.	.
1992 FEB	BDL	IMP	BDL	.	.	.	.
1992 MAR	BDL	BDL	BDL	.	.	.	.
1992 APR	BDL	BDL	BDL	.	.	.	.
1992 MAY	BDL	BDL	BDL	.	.	.	.
1992 JUN	BDL	BDL	BDL	.	.	.	.
1992 JUL	BDL	BDL	BDL	.	.	.	.
1992 AUG	BDL	BDL	BDL	.	.	.	.
1992 SEP	BDL	BDL	BDL	.	.	.	.
1992 OCT	BDL	BDL	BDL	.	.	.	.
1992 NOV	BDL	BDL	BDL	.	.	.	.
1992 DEC	BDL	BDL	BDL	.	.	.	.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 LONDON (LAKE HURON) WSS

TREATMENT PLANT RAW	RESERVOIR ARVA	TREATMENT PLANT TREATED	DIST. SYSTEM BROOKSIDE ST FREE FLOW	DIST. SYSTEM STANDING	RR#1 GRAND BEND FREE FLOW	DIST. SYSTEM SURREY CT FREE FLOW	DIST. SYSTEM SURREY CT STANDING
METALS							
COBALT (UG/L)			DET'N LIMIT = 0.02				
			GUIDELINE = N/A				
1991 JAN	.290 <T	.240 <T	.200 <T	.	.	.	.
1991 MAR	.060 <T	.110 <T	.070 <T	.	.060 <T	.	.
1991 MAY	.050 <T	.190 <T	.070 <T	.	.140 <T	.	.
1991 JUL	BDL	BDL	BDL	.	BDL	.	.
1991 SEP	.110 <T	.110 <T	.130 <T	.	.	.100 <T	.
1991 NOV	.070 <T	.130 <T	.110 <T	.100 <T	.	.220 <T	.190 <T
1992 MAR	.160 <T	.120 <T	.100 <T	.	.	.	.
1992 JUN	.180 <T	IMP	.130 <T	.	.	.	.
1992 SEP	.180 <T	.170 <T	.180 <T	.	.	.	.
1992 DEC	3.000	.	.110 <T	.	.	.	.
CHROMIUM (UG/L)			DET'N LIMIT = 0.50				
			GUIDELINE = 50.0 (A1)				
1991 JAN	2.100 <T	2.100 <T	1.800 <T	.	.	.	.
1991 MAR	1.700 <T	1.700 <T	.810 <T	.	1.700 <T	.	.
1991 MAY	2.100 <T	2.300 <T	2.200 <T	.	2.400 <T	.	.
1991 JUL	.600 <T	.800 <T	.580 <T	.	.790 <T	.	.
1991 SEP	BDL	BDL	BDL	BDL	.	.520 <T	BDL
1991 NOV	1.700 <T	BDL	BDL	BDL	.	.	.
1992 MAR	BDL	BDL	BDL	.	.	.	.
1992 JUN	BDL	BDL	BDL	.	.	.	.
1992 SEP	3.400 <T	IMP	3.200 <T	.	.	.	.
1992 DEC	BDL	2.900 <T	1.500 <T	.	.	.	.
COPPER (UG/L)			DET'N LIMIT = 0.50				
			GUIDELINE = 1000 (A3)				
1991 JAN	2.300 <T	.760 <T	.940 <T	.	.	.	.
1991 MAR	2.600 <T	1.500 <T	1.700 <T	.	2.500 <T	.	.
1991 MAY	4.300 <T	2.900 <T	1.300 <T	.	2.200 <T	.	.
1991 JUL	1.400 <T	48.000	3.000 <T	.	2.600 <T	.	.
1991 SEP	6.800	3.100 <T	3.300 <T	.	.	1.900 <T	.
1991 NOV	3.900 <T	4.100 <T	2.900 <T	4.700 <T	33.000	2.100 <T	12.000
1992 MAR	5.700	2.300 <T	5.900	.	.	.	.
1992 JUN	2.000 <T	IMP	1.400 <T	.	.	.	.
1992 SEP	2.800 <T	1.600 <T	6.200	.	.	.	.
1992 DEC	3.900 <T	.	5.500	.	.	.	.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 LONDON (LAKE HURON) WSS

TREATMENT PLANT RAW	RESERVOIR ARVA	TREATMENT PLANT TREATED	DIST. SYSTEM BROOKSIDE ST FREE FLOW	DIST. SYSTEM BROOKSIDE ST STANDING	RR#1 GRAND BEND FREE FLOW	DIST. SYSTEM SURREY CT FREE FLOW	DIST. SYSTEM SURREY CT STANDING
IRON (UG/L)							
METALS			DET'N LIMIT = 6.00				
			GUIDELINE = 300 (A3)				
1991 JAN	BDL	BDL	9,200 <T	.	.	.	.
1991 MAR	32,000 <T	95,000	15,000 <T	.	.	10,000 <T	.
1991 MAY	40,000 <T	22,000 <T	BDL	.	.	BDL	.
1991 JUL	24,000 <T	BDL	7,800 <T	.	.	BDL	.
1991 SEP	27,000 <T	BDL	BDL	.	.	8,200 <T	.
1991 NOV	17,000 <T	BDL	17,000 <T	18,000 <T	.	BDL	BDL
1992 MAR	150,000	BDL	7,000 <T	.	.	.	.
1992 JUN	15,000 <T	14P	9,800 <T	.	.	.	.
1992 SEP	54,000 <T	BDL	BDL	.	.	.	.
1992 DEC	21,000 <T	BDL	BDL	.	.	.	.
MERCURY (UG/L)							
			DET'N LIMIT = 0.02				
			GUIDELINE = 1.0 (A1)				
1991 JAN	BDL	BDL	BDL	.	.	.	.
1991 MAR	BDL	BDL	BDL	.	.	.	.
1991 MAY	BDL	BDL	BDL	.	.	.	.
1991 JUL	BDL	BDL	BDL	.	.	.	.
1991 SEP	BDL	BDL	BDL	.	.	.	.
1991 NOV	BDL	BDL	BDL	.	.	.	.
1992 MAR	BDL	BDL	BDL	.	.	.	.
1992 JUN	BDL	BDL	BDL	.	.	.	.
1992 SEP	BDL	BDL	BDL	.	.	.	.
1992 DEC	BDL	BDL	BDL	.	.	.	.
MANGANESE (UG/L)							
			DET'N LIMIT = 0.05				
			GUIDELINE = 50.0 (A3)				
1991 JAN	7,200	.720	1,300	.	.	.	.
1991 MAR	1,500	3,900	.810	.	.	.670	.
1991 MAY	1,700	.400 <T	.580	.	.	.210 <T	.
1991 JUL	2,000	.410 <T	.880	.	.	.310 <T	.
1991 SEP	1,700	.230 <T	.320 <T	.	.	.	.
1991 NOV	.950	.160 <T	.300 <T	1,300	.	.400 <T	.
1992 MAR	6,100	.430 <T	1,100	.	.	.270 <T	.390 <T
1992 JUN	1,500	14P	.720	.	.	.	.
1992 SEP	2,400	.170 <T	.490 <T	.	.	.	.
1992 DEC	.640	.	.690	.	.	.	.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 LONDON (LAKE HURON) WSS

TREATMENT PLANT RAW	RESERVOIR ARVA	TREATMENT PLANT TREATED	DIST. SYSTEM BROOKSIDE ST FREE FLOW	DIST. SYSTEM BROOKSIDE ST STANDING	DIST. SYSTEM RR#1 GRAND BEND FREE FLOW	DIST. SYSTEM SURREY CT FREE FLOW	DIST. SYSTEM SURREY CT STANDING
METALS							
MOLYBDENUM (UG/L)			DET'N LIMIT = 0.05				
			GUIDELINE = N/A				
1991 JAN		.480 <T					
1991 MAR	.320 <T	.410 <T					
1991 MAY	.460 <T	.510			.450 <T		
1991 JUL	.520	.430 <T			.380 <T		
1991 SEP	.430 <T	.460 <T			.520		
1991 NOV	.440 <T	.350 <T				.390 <T	
1992 MAR	.190 <T	.410 <T	.360 <T	.400 <T		.400 <T	.400 <T
1992 JUN	.300 <T	.320 <T					
1992 SEP	.500 <T	.290 <T					
1992 DEC	.520	.560					
			DET'N LIMIT = 0.20				
			GUIDELINE = 350 (03)				
1991 JAN	1.100 <T	.470 <T					
1991 MAR	.720 <T	.430 <T					
1991 MAY	.900 <T	5.600			BDL		
1991 JUL	.230 <T	BDL			BDL		
1991 SEP	.880 <T	.760 <T			.350 <T		
1991 NOV	.890 <T	.570 <T					
1992 MAR	1.100 <T	2.400				.740 <T	
1992 JUN	.340 <T	3.600				BDL	4.300
1992 SEP	.820 <T	4.900	BDL	.320 <T			
1992 DEC	14.000	11.000					
			DET'N LIMIT = 0.05				
			GUIDELINE = 10 (A1)				
1991 JAN	.700	BDL					
1991 MAR	.200 <T	.170 <T					
1991 MAY	.450 <T	.350 <T			.200 <T		
1991 JUL	.110 <T	.140 <T			.240 <T		
1991 SEP	.640	.090 <T			.290 <T		
1991 NOV	.210 <T	.200 <T				.290 <T	
1992 MAR	1.000	BDL	.400 <T	2.200		.300 <T	1.600
1992 JUN	.230 <T	.230 <T					
1992 SEP	.370 <T	.390 <T					
1992 DEC	.180 <T	.120 <T					
			DET'N LIMIT = 0.05				
			GUIDELINE = 10 (A1)				
1991 JAN	.700	BDL					
1991 MAR	.200 <T	.170 <T					
1991 MAY	.450 <T	.350 <T			.200 <T		
1991 JUL	.110 <T	.140 <T			.240 <T		
1991 SEP	.640	.090 <T			.290 <T		
1991 NOV	.210 <T	.200 <T				.290 <T	
1992 MAR	1.000	BDL	.400 <T	2.200		.300 <T	1.600
1992 JUN	.230 <T	.230 <T					
1992 SEP	.370 <T	.390 <T					
1992 DEC	.180 <T	.120 <T					

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 LONDON (LAKE HURON) WSS

TREATMENT PLANT RAW	RESERVOIR ARVA	TREATMENT PLANT TREATED	DIST. SYSTEM BROOKSIDE ST FREE FLOW	DIST. SYSTEM BROOKSIDE ST STANDING	DIST. SYSTEM RR#1 GRAND BEND FREE FLOW	DIST. SYSTEM SURREY CT FREE FLOW	DIST. SYSTEM SURREY CT STANDING
METALS							
ANTIMONY (UG/L)			DET'N LIMIT = 0.05				
			GUIDELINE = 146 (04)				
1991 JAN	.540	.490 <T	.510	.	.	.	.
1991 MAR	.630	.660	.	.	.570	.	.
1991 MAY	.610	.490 <T	.	.	.420 <T	.	.
1991 JUL	.640	.550	.560	.	.480 <T	.	.
1991 SEP	.670	.710	.650	.	.	.	.
1991 NOV	.520	.450 <T	.430 <T	.480 <T	.470 <T	.620	.730
1992 MAR	.300 <T	.380 <T	.	.	.	.510	.
1992 JUN	.360 <T	.270 <T	.240 <T	.	.	.	.
1992 SEP	.420 <T	.440 <T	.400 <T	.	.	.	.
1992 DEC	.520	.	.460 <T	.	.	.	.
SELENIUM (UG/L)			DET'N LIMIT = 1.00				
			GUIDELINE = 10 (A1)				
1991 JAN	BOL	1.900 <T	1.300 <T	.	.	.	.
1991 MAR	BOL	BOL	1.100 <T	.	BOL	.	.
1991 MAY	BOL	BOL	1.200 <T	.	BOL	.	.
1991 JUL	BOL	BOL	1.100 <T	.	BOL	.	.
1991 SEP	BOL	BOL	BOL	.	.	BOL	.
1991 NOV	BOL	BOL	BOL	BOL	.	BOL	BOL
1992 MAR	BOL	BOL	BOL	.	.	BOL	.
1992 JUN	BOL	1WP	BOL	.	.	.	.
1992 SEP	BOL	BOL	BOL	.	.	.	.
1992 DEC	BOL	BOL	BOL	.	.	.	.
STRONTIUM (UG/L)			DET'N LIMIT = 0.10				
			GUIDELINE = N/A				
1991 JAN	110.000	98.000	100.000	.	.	.	.
1991 MAR	100.000	100.000	100.000	.	98.000	.	.
1991 MAY	99.000	110.000	97.000	.	100.000	.	.
1991 JUL	97.000	97.000	97.000	.	94.000	.	.
1991 SEP	110.000	110.000	110.000	.	.	110.000	110.000
1991 NOV	110.000	100.000	100.000	100.000	100.000	110.000	110.000
1992 MAR	130.000	130.000	130.000	.	.	110.000	.
1992 JUN	110.000	110.000	110.000	.	.	.	.
1992 SEP	100.000	100.000	100.000	.	.	.	.
1992 DEC	110.000	.	110.000	.	.	.	.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 LONDON (LAKE HURON) WSS

TREATMENT PLANT RAW	RESERVOIR ARVA	TREATMENT PLANT TREATED	DIST. SYSTEM BROOKSIDE ST FREE FLOW	DIST. SYSTEM BROOKSIDE ST STANDING	DIST. SYSTEM RR#1 GRAND BEND FREE FLOW	DIST. SYSTEM SURREY CT FREE FLOW	DIST. SYSTEM SURREY CT STANDING
METALS							
TITANIUM (UG/L)			DET'N LIMIT = 0.50				
			GUIDELINE = N/A				
1991 JAN	4,900 <T	3,900 <T	.	.	3,900 <T	.	.
1991 MAR	7,000	4,000 <T	.	.	1,600 <T	.	.
1991 MAY	2,800 <T	1,800 <T	.	.	2,100 <T	.	.
1991 JUL	2,600 <T	1,700 <T	.	.	.	.800 <T	.
1991 SEP	1,100 <T	.970 <T	.	.	.	.910 <T	.960 <T
1991 NOV	1,600 <T	.850 <T	.910 <T	.830 <T	.	.	.
1992 MAR	3,400 <T	3,100 <T	.	.	.	.	.
1992 JUN	2,000 <T	1,700 <T	.	.	.	.	.
1992 SEP	2,400 <T	1,100 <T	.	.	.	.	.
1992 DEC	8,500	.850 <T	.	.	.	.	.
THALLIUM (UG/L)			DET'N LIMIT = 0.05				
			GUIDELINE = 13 (D4)				
36 SAMPLES			BDL	BDL	BDL	BDL	BDL
URANIUM (UG/L)							
			DET'N LIMIT = 0.05				
			GUIDELINE = 100 (A1)				
1991 JAN	.280 <T	.130 <T	.	.	.	.	.
1991 MAR	.220 <T	.270 <T	.	.	.160 <T	.	.
1991 MAY	.200 <T	.110 <T	.	.	.120 <T	.	.
1991 JUL	.150 <T	.080 <T	.	.	.060 <T	.	.
1991 SEP	.220 <T	.200 <T	.	.	.	.210 <T	.
1991 NOV	.200 <T	.180 <T	.190 <T	.190 <T	.	.190 <T	.180 <T
1992 MAR	.120 <T	BDL	.	.	.	.	.
1992 JUN	.210 <T	.220 <T	.	.	.	.	.
1992 SEP	.200 <T	.130 <T	.	.	.	.	.
1992 DEC	.160 <T	.170 <T	.	.	.	.	.
VANADIUM (UG/L)			DET'N LIMIT = 0.05				
			GUIDELINE = N/A				
1991 JAN	.150 <T	.170 <T	.	.	.	.	.
1991 MAR	BDL	.530	.	.	.150 <T	.	.
1991 MAY	.240 <T	.480 <T	.	.	.420 <T	.	.
1991 JUL	BDL	.260 <T	.	.	.240 <T	.	.
1991 SEP	.130 <T	.340 <T	.	.	.	.390 <T	.
1991 NOV	BDL	.080 <T	.140 <T	.180 <T	.	.120 <T	.190 <T
1992 MAR	.110 <T	.300 <T	.	.	.	.	.
1992 JUN	BDL	BDL	.	.	.	.	.
1992 SEP	.310 <T	.490 <T	.	.	.	.	.
1992 DEC	.290 <T	.340 <T	.	.	.	.	.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 LONDON (LAKE HURON) WSS

ZINC (UG/L)	TREATMENT PLANT RAW	RESERVOIR ARVA	TREATMENT PLANT TREATED	DIST. SYSTEM BROOKSIDE ST FREE FLOW	DIST. SYSTEM BROOKSIDE ST STANDING	DIST. SYSTEM RR#1 GRAND BEND FREE FLOW	DIST. SYSTEM SURREY CT FREE FLOW	DIST. SYSTEM SURREY CT STANDING
DET'N LIMIT = 0.20								
GUIDELINE = 5000 (A3)								
METALS								
1991 JAN	13,000	3,000	7,100	.	.	.	.	.
1991 MAR	5,400	2,900	8,000	.	.	3,200	.	.
1991 MAY	4,900	.850 <T	3,700	.	.	.670 <T	.	.
1991 JUL	3,200	3,800	11,000	.	.	3,500	.	.
1991 SEP	11,000	.630 <T	10,000	.	.	.	.710 <T	.
1991 NOV	4,300	1,900 <T	8,900	2,300	5,400	.	1,800 <T	8,700
1992 MAR	12,000	2,400	12,000	.	.	.	.	.
1992 JUN	4,300	1WP	6,500	.	.	.	.	.
1992 SEP	6,100	1,600 <T	22,000	.	.	.	.	.
1992 DEC	9,400	.	6,600	.	.	.	.	.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 LONDON (LAKE HURON) WSS

TREATMENT PLANT RAW	RESERVOIR ARVA	TREATMENT PLANT TREATED	DIST. SYSTEM BROOKSIDE ST FREE FLOW	DIST. SYSTEM BROOKSIDE ST STANDING	RR#1 GRAND BEND FREE FLOW	DIST. SYSTEM SURREY CT FREE FLOW	DIST. SYSTEM SURREY CT STANDING
CHLOROPARACETAMOLS							
HEXACHLOROBUTADIENE (NG/L)			GUIDELINE = 450 (D4)				
23 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	BDL
123-TRICHLOROBENZENE (NG/L)			GUIDELINE = N/A				
23 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1234-TETCHLOROBENZENE (NG/L)			GUIDELINE = N/A				
23 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1235-TETCHLOROBENZENE (NG/L)			GUIDELINE = N/A				
23 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	BDL
124-TRICHLOROBENZENE (NG/L)			GUIDELINE = 10000 (1)				
23 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1245-TETCHLOROBENZENE (NG/L)			GUIDELINE = 38000 (D4)				
23 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	BDL
135-TRICHLOROBENZENE (NG/L)			GUIDELINE = N/A				
23 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	BDL
HEXACHLOROBENZENE (NG/L)			GUIDELINE = 10 (C1)				
22 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	BDL
HEXACHLOROETHANE (NG/L)			GUIDELINE = 1900 (D4)				
1991 JAN	BDL	1,000 <T	BDL	BDL	BDL	BDL	BDL
1991 MAR	BDL	100	BDL	BDL	BDL	BDL	BDL
1991 MAY	BDL	100	BDL	BDL	BDL	BDL	BDL
1991 JUL	BDL	100	BDL	BDL	BDL	BDL	BDL
1991 SEP	BDL	100	BDL	BDL	BDL	BDL	BDL
1991 NOV	BDL	100	BDL	BDL	BDL	BDL	BDL
1991 DEC	BDL	100	BDL	BDL	BDL	BDL	BDL
1992 JAN	BDL	1,000 <T	BDL	BDL	BDL	BDL	BDL
1992 FEB	BDL	1,000 <T	BDL	BDL	BDL	BDL	BDL
1992 MAR	BDL	1,000 <T	BDL	BDL	BDL	BDL	BDL
1992 APR	BDL	1,000 <T	BDL	BDL	BDL	BDL	BDL
1992 MAY	BDL	1,000 <T	BDL	BDL	BDL	BDL	BDL
1992 JUN	BDL	1,000 <T	BDL	BDL	BDL	BDL	BDL
1992 JUL	BDL	1,000 <T	BDL	BDL	BDL	BDL	BDL
1992 AUG	BDL	1,000 <T	BDL	BDL	BDL	BDL	BDL
1992 SEP	BDL	1,000 <T	BDL	BDL	BDL	BDL	BDL
1992 OCT	BDL	1,000 <T	BDL	BDL	BDL	BDL	BDL
1992 NOV	BDL	1,000 <T	BDL	BDL	BDL	BDL	BDL
1992 DEC	BDL	1,000 <T	BDL	BDL	BDL	BDL	BDL
OCTACHLOROSTYRENE (NG/L)			GUIDELINE = N/A				
23 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	BDL

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 LONDON (LAKE HURON) MSS

TREATMENT PLANT RAW	RESERVOIR ARVA	TREATMENT PLANT TREATED	DIST. SYSTEM BROOKSIDE ST FREE FLOW	DIST. SYSTEM BROOKSIDE ST STANDING	DIST. SYSTEM RR#1 GRAND BEND FREE FLOW	DIST. SYSTEM SURREY CT FREE FLOW	DIST. SYSTEM SURREY CT STANDING
CHLOROPARATICS							
PENTACHLOROBENZENE (NG/L)		DET'N LIMIT = 1,000		GUIDELINE = 74,000 (D4)			
23 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	BDL
236-TRICHLOROTOLUENE (NG/L)		DET'N LIMIT = 5,000		GUIDELINE = N/A			
1991 JAN	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1991 MAR	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1991 MAY	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1991 JUL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1991 SEP	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1991 NOV	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1992 MAR	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1992 JUN	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1992 SEP	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1992 DEC	BDL	BDL	BDL	BDL	BDL	BDL	BDL
245-TRICHLOROTOLUENE (NG/L)		DET'N LIMIT = 5,000		GUIDELINE = N/A			
23 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	BDL
26A-TRICHLOROTOLUENE (NG/L)		DET'N LIMIT = 5,000		GUIDELINE = N/A			
23 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	BDL

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 LONDON (LAKE HURON) WSS

TREATMENT PLANT RAW	RESERVOIR ARVA	TREATMENT PLANT TREATED	DIST. SYSTEM BROOKSIDE ST FREE FLOW	DIST. SYSTEM BROOKSIDE ST STANDING	DIST. SYSTEM RR#1 GRAND BEND FREE FLOW	DIST. SYSTEM SURREY CT STANDING
CHLOROPHENOLS						
234-TRICHLOROPHENOL (NG/L)		DET'N LIMIT = 100.0	GUIDELINE = N/A			
3 SAMPLES	BDL	BDL				
2345-TETCHLOROPHENOL (NG/L)		DET'N LIMIT = 20.0	GUIDELINE = N/A			
3 SAMPLES	BDL	BDL				
2356-TETCHLOROPHENOL (NG/L)		DET'N LIMIT = 10.0	GUIDELINE = N/A			
3 SAMPLES	BDL	BDL				
245-TRICHLOROPHENOL (NG/L)		DET'N LIMIT = 100.0	GUIDELINE = 2600000 (04)			
3 SAMPLES	BDL	BDL				
246-TRICHLOROPHENOL (NG/L)		DET'N LIMIT = 20.0	GUIDELINE = 5000 (A1)			
3 SAMPLES	BDL	BDL				
PENTACHLOROPHENOL (NG/L)		DET'N LIMIT = 10.00	GUIDELINE = 60000 (A1)			
3 SAMPLES	BDL	BDL				

TABLE 4.
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 LONDON (LAKE HURON) WSS

PESTICIDES AND PCB									
TREATMENT PLANT RAW	RESERVOIR ARVA	TREATMENT PLANT TREATED	DIST. SYSTEM BROOKSIDE ST FREE FLOW	DIST. SYSTEM BROOKSIDE ST STANDING	DIST. SYSTEM RR#1 GRAND BEND FREE FLOW	DIST. SYSTEM SURREY CT FREE FLOW	DIST. SYSTEM SURREY CT STANDING		
ALDRIN (NG/L)			DET'N LIMIT = 1.000	GUIDELINE = 700 (A1)					
23 SAMPLES	BDL	BDL	BDL	BDL		BDL	BDL		
ALPHA BHC (NG/L)			DET'N LIMIT = 1.000	GUIDELINE = 700 (G)					
1991 JAN	1.000 <T	1.000 <T	1.000 <T						
1991 MAR	2.000 <T	1.000 <T	1.000 <T						
1991 MAY	1.000 <T	1.000 <T	1.000 <T						
1991 JUL	1.000 <T	1.000 <T	1.000 <T						
1991 SEP	1.000 <T	1.000 <T	1.000 <T						
1991 NOV	2.000 <T	1.000 <T	1.000 <T						
1992 MAR	1.000 <T	1.000 <T	1.000 <T						
1992 JUN	1.000 <T	1.000 <T	1.000 <T						
1992 SEP	1.000 <T	1.000 <T	1.000 <T						
1992 DEC	BDL	BDL	BDL						
BETA BHC (NG/L)			DET'N LIMIT = 1.000	GUIDELINE = 300 (G)					
23 SAMPLES	BDL	BDL	BDL	BDL		BDL	BDL		
LINDANE (GAMMA BHC) (NG/L)			DET'N LIMIT = 1.000	GUIDELINE = 4000 (A1)					
23 SAMPLES	BDL	BDL	BDL	BDL		BDL	BDL		
ALPHA CHLORDANE (NG/L)			DET'N LIMIT = 2.000	GUIDELINE = 7000 (A1)					
23 SAMPLES	BDL	BDL	BDL	BDL		BDL	BDL		
GAMMA CHLORDANE (NG/L)			DET'N LIMIT = 2.000	GUIDELINE = 7000 (A1)					
23 SAMPLES	BDL	BDL	BDL	BDL		BDL	BDL		
DIELDRIN (NG/L)			DET'N LIMIT = 2.000	GUIDELINE = 700 (A1)					
23 SAMPLES	BDL	BDL	BDL	BDL		BDL	BDL		
METHOXYCHLOR (NG/L)			DET'N LIMIT = 5.0	GUIDELINE = 900000 (A1)					
23 SAMPLES	BDL	BDL	BDL	BDL		BDL	BDL		
ENDOSULFAN I (NG/L)			DET'N LIMIT = 2.000	GUIDELINE = 74000 (D4)					
23 SAMPLES	BDL	BDL	BDL	BDL		BDL	BDL		
ENDOSULFAN II (NG/L)			DET'N LIMIT = 5.000	GUIDELINE = 74000 (D4)					
23 SAMPLES	BDL	BDL	BDL	BDL		BDL	BDL		

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 LONDON (LAKE HURON) WSS

TREATMENT PLANT RAW	RESERVOIR ARVA	TREATMENT PLANT TREATED	DIST. SYSTEM BROOKSIDE ST FREE FLOW	DIST. SYSTEM BROOKSIDE ST STANDING	DIST. SYSTEM RR#1 GRAND BEND FREE FLOW	DIST. SYSTEM SURREY CT STANDING
PESTICIDES AND PCB						
ENDRIN (NG/L)		DET'N LIMIT = 5.000		GUIDELINE = 1600 (D3)		
23 SAMPLES	BDL	BDL	BDL		BDL	BDL
ENDOSULFAN SULPHATE (NG/L)		DET'N LIMIT = 5.00		GUIDELINE = N/A		
23 SAMPLES	BDL	BDL	BDL		BDL	BDL
HEPTACHLOR EPOXIDE (NG/L)		DET'N LIMIT = 1.000		GUIDELINE = 3000 (A1)		
15 SAMPLES	BDL	BDL	IQU		BDL	IQU
HEPTACHLOR (NG/L)		DET'N LIMIT = 1.000		GUIDELINE = 3000 (A1)		
23 SAMPLES	BDL	BDL	BDL		BDL	BDL
MIREX (NG/L)		DET'N LIMIT = 5.000		GUIDELINE = N/A		
23 SAMPLES	BDL	BDL	BDL		BDL	BDL
OXYCHLORDANE (NG/L)		DET'N LIMIT = 2.000		GUIDELINE = N/A		
23 SAMPLES	BDL	BDL	BDL		BDL	BDL
O,P-DDT (NG/L)		DET'N LIMIT = 5.000		GUIDELINE = 30000 (A1)		
23 SAMPLES	BDL	BDL	BDL		BDL	BDL
PCB (NG/L)		DET'N LIMIT = 20.00		GUIDELINE = 3000 (A2)		
21 SAMPLES	BDL	BDL	BDL		BDL	BDL
P,P-DDD (NG/L)		DET'N LIMIT = 5.000		GUIDELINE = 30000 (A1)		
23 SAMPLES	BDL	BDL	BDL		BDL	BDL
P,P-DDE (NG/L)		DET'N LIMIT = 1.000		GUIDELINE = 30000 (A1)		
23 SAMPLES	BDL	BDL	BDL		BDL	BDL
P,P-DDT (NG/L)		DET'N LIMIT = 5.000		GUIDELINE = 30000 (A1)		
23 SAMPLES	BDL	BDL	BDL		BDL	BDL
TOXAPHENE (NG/L)		DET'N LIMIT = 500.0		GUIDELINE = 5000 (A1)		
18 SAMPLES	BDL	BDL	BDL		BDL	BDL

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 LONDON (LAKE HURON) WSS

TREATMENT PLANT RAW	RESERVOIR ARVA	TREATMENT PLANT TREATED	DIST. SYSTEM BROOKSIDE ST FREE FLOW	DIST. SYSTEM BROOKSIDE ST STANDING	DIST. SYSTEM RR#1 GRAND BEND FREE FLOW	DIST. SYSTEM SURREY CT STANDING
PESTICIDES AND PCB						
AMETRINE (NG/L)			DET'N LIMIT = 50.0	GUIDELINE = 300000 (D3)		
23 SAMPLES	BOL	BOL	BOL			
ATRAZINE (NG/L)			DET'N LIMIT = 50.0	GUIDELINE = 60000 (A2)		
1991 JAN	BOL	BOL				
1991 MAR	BOL	BOL				
1991 MAY	BOL	BOL				
1991 JUL	IAW	IAW				
1991 SEP	IAW	IAW				
1991 NOV	BOL	BOL				
1992 MAR	BOL	BOL				
1992 JUN	BOL	BOL				
1992 SEP	60,000 <T	60,000 <T	60,000 <T			
1992 DEC	BOL		50,000 <T			
ATRATONE (NG/L)			DET'N LIMIT = 50.0	GUIDELINE = N/A		
23 SAMPLES	BOL	BOL	BOL			
CYANAZINE (BLADEX) (NG/L)			DET'N LIMIT = 100.0	GUIDELINE = 10000 (A2)		
23 SAMPLES	BOL	BOL	BOL			
DESETHYL ATRAZINE (NG/L)			DET'N LIMIT = 200.0	GUIDELINE = 60000 (A2)		
23 SAMPLES	BOL	BOL	BOL			
DESETHYL SIMAZINE (NG/L)			DET'N LIMIT = 200.0	GUIDELINE = 10000 (A2)		
23 SAMPLES	BOL	BOL	BOL			
PROMETONE (NG/L)			DET'N LIMIT = 50.000	GUIDELINE = 52500 (D3)		
23 SAMPLES	BOL	BOL	BOL			
PROPACINE (NG/L)			DET'N LIMIT = 50.000	GUIDELINE = 700000 (D3)		
23 SAMPLES	BOL	BOL	BOL			
PROMETRYNE (NG/L)			DET'N LIMIT = 50.000	GUIDELINE = 1000 (A2)		
23 SAMPLES	BOL	BOL	BOL			
METRIBUZIN (SENCOR) (NG/L)			DET'N LIMIT = 100.0	GUIDELINE = 80000 (A1)		
23 SAMPLES	BOL	BOL	BOL			

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 LONDON (LAKE HURON) WSS

TREATMENT PLANT RAW	RESERVOIR ARVA	TREATMENT PLANT TREATED	DIST. SYSTEM BROOKSIDE ST FREE FLOW	DIST. SYSTEM BROOKSIDE ST STANDING	DIST. SYSTEM RR#1 GRAND BEND FREE FLOW	DIST. SYSTEM SURREY CT FREE FLOW	DIST. SYSTEM SURREY CT STANDING
PESTICIDES AND PCB							
SIMAZINE (NG/L)		DET'N LIMIT = 50.00		GUIDELINE = 10000 (A2)			
23 SAMPLES	BDL	BDL					
ALACHLOR (LASSO) (NG/L)		DET'N LIMIT = 500.0		GUIDELINE = 5000 (A2)			
23 SAMPLES	BDL	BDL					
METOLACHLOR (NG/L)		DET'N LIMIT = 500.0		GUIDELINE = 50000 (A2)			
23 SAMPLES	BDL	BDL					
HEXACHLOROCYCLOPENTADIEN (NG/L)		DET'N LIMIT = 5.00		GUIDELINE = 206000 (D4)			
1991 JAN	BDL	35.000 <T					
1991 MAR	BDL	IQU					
1991 MAY	IQU	BDL			BDL		
1991 JUL	IQU	IQU			24.000 <T		
1991 SEP	IQU	IQU			IQU		
1991 NOV	IQU	IQU			IQU		
1992 MAR	BDL	20.000 <T				IQU	
1992 JUN	IQU	IQU	20.000 <T			BDL	
1992 SEP	IQU	IQU					
1992 DEC	IQU	IQU					

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 LONDON (LAKE HURON) WSS

PHENOLICS (UG/L)											
TREATMENT PLANT RAW	RESERVOIR ARVA	TREATMENT PLANT TREATED	DET'N LIMIT =		GUIDELINE = N/A		DIST. SYSTEM BROOKSIDE ST FREE FLOW	DIST. SYSTEM BROOKSIDE ST STANDING	DIST. SYSTEM RR#1 GRAND BEND FREE FLOW	DIST. SYSTEM SURREY CT FREE FLOW	DIST. SYSTEM SURREY CT STANDING
			0.2	0.2	0.2	0.2					
PHENOLICS											
1991 JAN	.600 <T	IRE	.600 <T	.600 <T	.600 <T	.600 <T	.600 <T	.600 <T	.600 <T	.600 <T	.600 <T
1991 MAR	.400 <T	.600 <T	.400 <T	.600 <T	.400 <T	.600 <T	.400 <T	.600 <T	.400 <T	.600 <T	.400 <T
1991 MAY	BDL	.800 <T	BDL	.800 <T	BDL	.800 <T	BDL	.800 <T	BDL	.800 <T	BDL
1991 JUL	.200 <T	BDL	.200 <T	.600 <T	.200 <T	.600 <T	.200 <T	.600 <T	.200 <T	.600 <T	.200 <T
1991 SEP	.600 <T	BDL	.600 <T	.600 <T	.600 <T	.600 <T	.600 <T	.600 <T	.600 <T	.600 <T	.600 <T
1991 NOV	.800 <T	.400 <T	.800 <T	.600 <T	.800 <T	.600 <T	.800 <T	.600 <T	.800 <T	.600 <T	.800 <T
1992 MAR	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1992 JUN	2.600	.800 <T	2.600	.800 <T	.800 <T	.800 <T	.800 <T	.800 <T	.800 <T	.800 <T	.800 <T
1992 SEP	.600 <T	.400 <T	.600 <T	.400 <T	.400 <T	.400 <T	.400 <T	.400 <T	.400 <T	.400 <T	.400 <T
1992 DEC	BDL	.600 <T	.600 <T	.600 <T	.600 <T	.600 <T	.600 <T	.600 <T	.600 <T	.600 <T	.600 <T

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 LONDON (LAKE HURON) WSS

POLYAROMATIC HYDROCARBONS							
PHENANTHRENE (NG/L)		DET'N LIMIT = 10.0	GUIDELINE = N/A				
14 SAMPLES	BDL	BDL				BDL	
ANTHRACENE (NG/L)		DET'N LIMIT = 1.0	GUIDELINE = N/A				
14 SAMPLES	BDL	BDL				BDL	
FLUORANTHENE (NG/L)		DET'N LIMIT = 20.0	GUIDELINE = 42000 (04)				
14 SAMPLES	BDL	BDL				BDL	
PYRENE (NG/L)		DET'N LIMIT = 20.0	GUIDELINE = N/A				
14 SAMPLES	BDL	BDL				BDL	
BENZO(A)ANTHRACENE (NG/L)		DET'N LIMIT = 20.0	GUIDELINE = N/A				
14 SAMPLES	BDL	BDL				BDL	
CHRYSENE (NG/L)		DET'N LIMIT = 50.0	GUIDELINE = N/A				
14 SAMPLES	BDL	BDL				BDL	
DIMETH. BENZ(A)ANTHR (NG/L)		DET'N LIMIT = 5.0	GUIDELINE = N/A				
14 SAMPLES	BDL	BDL				BDL	
BENZO(E) PYRENE (NG/L)		DET'N LIMIT = 50.0	GUIDELINE = N/A				
14 SAMPLES	BDL	BDL				BDL	
BENZO(B) FLUORANTHENE (NG/L)		DET'N LIMIT = 10.0	GUIDELINE = N/A				
14 SAMPLES	BDL	BDL				BDL	
PERYLENE (NG/L)		DET'N LIMIT = 10.0	GUIDELINE = N/A				
14 SAMPLES	BDL	BDL				BDL	
BENZO(K) FLUORANTHENE (NG/L)		DET'N LIMIT = 1.0	GUIDELINE = N/A				
14 SAMPLES	BDL	BDL				BDL	
BENZO(A) PYRENE (NG/L)		DET'N LIMIT = 5.0	GUIDELINE = 10 (A1)				
14 SAMPLES	BDL	BDL				BDL	

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 LONDON (LAKE HURON) WSS

TREATMENT PLANT RAW	RESERVOIR ARVA	TREATMENT PLANT TREATED	DIST. SYSTEM FREE FLOW	DIST. SYSTEM BROOKSIDE ST STANDING	DIST. SYSTEM RR#1 GRAND BEND FREE FLOW	DIST. SYSTEM SURREY CT FREE FLOW	DIST. SYSTEM SURREY CT STANDING
POLYAROMATIC HYDROCARBONS							
BENZO(G,H,I) PERYLEN (NG/L)		DET'N LIMIT = 20.0	GUIDELINE = N/A				
14 SAMPLES	BDL	BDL			BDL		
DIBENZO(A,H) ANTHRAC (NG/L)		DET'N LIMIT = 10.0	GUIDELINE = N/A				
14 SAMPLES	BDL	BDL			BDL		
INDENO(1,2,3-C,D) PY (NG/L)		DET'N LIMIT = 20.0	GUIDELINE = N/A				
14 SAMPLES	BDL	BDL			BDL		
BENZO(B) CHRYSENE (NG/L)		DET'N LIMIT = 2.0	GUIDELINE = N/A				
14 SAMPLES	BDL	BDL			BDL		
CORONENE (NG/L)		DET'N LIMIT = 10.0	GUIDELINE = N/A				
14 SAMPLES	BDL	BDL			BDL		

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 LONDON (LAKE HURON) WSS

TREATMENT PLANT RAW	RESERVOIR ARVA	TREATMENT PLANT TREATED	DIST. SYSTEM FREE FLOW	DIST. SYSTEM BROOKSIDE ST STANDING	DIST. SYSTEM RR#1 GRAND BEND FREE FLOW	DIST. SYSTEM SURREY CT STANDING
SPECIFIC PESTICIDES						
TOXAPHENE (NG/L)		DET'N LIMIT = 500.0	GUIDELINE = 5000 (A1)			
5 SAMPLES	BDL	BDL			BDL	
2,4,5-T (NG/L)		DET'N LIMIT = 50.0	GUIDELINE = 280000 (A1)			
3 SAMPLES	BDL	BDL				
2,4-D (NG/L)		DET'N LIMIT = 100.0	GUIDELINE = 100000 (A1)			
3 SAMPLES	BDL	BDL				
2,4-DB (NG/L)		DET'N LIMIT = 200.0	GUIDELINE = N/A			
3 SAMPLES	BDL	BDL				
2,4 D PROPIONIC ACID (NG/L)		DET'N LIMIT = 100.0	GUIDELINE = N/A			
3 SAMPLES	BDL	BDL				
DICAMBA (NG/L)		DET'N LIMIT = 50.0	GUIDELINE = 120000 (A1)			
3 SAMPLES	BDL	BDL				
PICHLORAM (NG/L)		DET'N LIMIT = 100.00	GUIDELINE = 190000 (A2)			
3 SAMPLES	BDL	BDL				
2,4,5-TP (SILVEX) (NG/L)		DET'N LIMIT = 20.00	GUIDELINE = 10000 (A1)			
3 SAMPLES	BDL	BDL				
DIAZINON (NG/L)		DET'N LIMIT = 20.0	GUIDELINE = 20000 (A1)			
3 SAMPLES	BDL	BDL				
DICHLOROVOS (NG/L)		DET'N LIMIT = 20.0	GUIDELINE = N/A			
3 SAMPLES	BDL	BDL				
CHLORPYRIFOS (NG/L)		DET'N LIMIT = 20.0	GUIDELINE = N/A			
3 SAMPLES	BDL	BDL				
ETHION (NG/L)		DET'N LIMIT = 20.0	GUIDELINE = 35000 (G)			
3 SAMPLES	BDL	BDL				

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 LONDON (LAKE HURON) WSS

TREATMENT PLANT RAW	RESERVOIR ARVA	TREATMENT PLANT TREATED	DIST. SYSTEM FREE FLOW	DIST. SYSTEM BROOKSIDE ST STANDING	DIST. SYSTEM RR#1 GRAND BEND FREE FLOW	DIST. SYSTEM SURREY CT STANDING
SPECIFIC PESTICIDES						
MALATHION (NG/L)		DET'N LIMIT = 20.0	GUIDELINE = 190000 (A1)			
3 SAMPLES	BDL	BDL				
MEVINPHOS (NG/L)		DET'N LIMIT = 20.0	GUIDELINE = N/A			
3 SAMPLES	BDL	BDL				
METHYL PARATHION (NG/L)		DET'N LIMIT = 50.0	GUIDELINE = 9000 (O3)			
3 SAMPLES	BDL	BDL				
METHYLTRITHION (NG/L)		DET'N LIMIT = 20.0	GUIDELINE = N/A			
3 SAMPLES	BDL	BDL				
PARATHION (NG/L)		DET'N LIMIT = 20.0	GUIDELINE = 50000 (A1)			
3 SAMPLES	BDL	BDL				
PHORATE (NG/L)		DET'N LIMIT = 20.0	GUIDELINE = 2000 (A2)			
3 SAMPLES	BDL	BDL				
RELDAN (NG/L)		DET'N LIMIT = 20.0	GUIDELINE = N/A			
3 SAMPLES	BDL	BDL				
RONNEL (NG/L)		DET'N LIMIT = 20.0	GUIDELINE = N/A			
3 SAMPLES	BDL	BDL				
CARBOFURAN (NG/L)		DET'N LIMIT = 2000.0	GUIDELINE = 90000 (A1)			
2 SAMPLES	BDL	1LA				
CHLOROPHAPH (CIPC) (NG/L)		DET'N LIMIT = 2000.0	GUIDELINE = 350000 (G)			
2 SAMPLES	BDL	1LA				
DIALLATE (NG/L)		DET'N LIMIT = 2000.0	GUIDELINE = N/A			
2 SAMPLES	BDL	1LA				
EPTAM (NG/L)		DET'N LIMIT = 2000.0	GUIDELINE = N/A			
2 SAMPLES	BDL	1LA				

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 LONDON (LAKE HUROW) WSS

TREATMENT PLANT RAW	RESERVOIR ARVA	TREATMENT PLANT TREATED	DIST. SYSTEM BROOKSIDE ST FREE FLOW	DIST. SYSTEM BROOKSIDE ST STANDING	DIST. SYSTEM RR#1 GRAND BEND FREE FLOW	DIST. SYSTEM SURREY CT FREE FLOW	DIST. SYSTEM SURREY CT STANDING
SPECIFIC PESTICIDES							
IPC (NG/L)		DET'N LIMIT = 2000.0	GUIDELINE = N/A				
2 SAMPLES	BDL	ILA	BDL				
PROPOXUR (NG/L)		DET'N LIMIT = 2000.0	GUIDELINE = 140000 (D3)				
2 SAMPLES	BDL	ILA	BDL				
CARBARYL (NG/L)		DET'N LIMIT = 200.0	GUIDELINE = 90000 (A1)				
2 SAMPLES	BDL	ILA	BDL				
BUTYLATE (NG/L)		DET'N LIMIT = 2000.0	GUIDELINE = 245000 (D3)				
2 SAMPLES	BDL	ILA	BDL				

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 LONDON (LAKE HURON) WSS

TREATMENT PLANT RAW	RESERVOIR ARVA	TREATMENT PLANT TREATED	DIST. SYSTEM BROOKSIDE ST FREE FLOW	DIST. SYSTEM BROOKSIDE ST STANDING	DIST. SYSTEM RR#1 GRAND BEND FREE FLOW	DIST. SYSTEM SURREY CT STANDING
VOLATILES						
BENZENE (UG/L)	BDL	BDL	DET'N LIMIT = 0.05	GUIDELINE = 5 (A1)		
35 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL
TOLUENE (UG/L)						
	BDL	BDL	DET'N LIMIT = 0.05	GUIDELINE = 24 (A3)		
1991 JAN	.100 <T	.050 <T	.450 <T			
1991 MAR	BDL	BDL	BDL			
1991 MAY	BDL	BDL	BDL		BDL	
1991 JUL	BDL	BDL	BDL		BDL	
1991 SEP	BDL	BDL	BDL		BDL	
1991 NOV	BDL	.050 <T	.050 <T		BDL	
1992 MAR	BDL	BDL	BDL		.050 <T	
1992 JUN	BDL	BDL	BDL			
1992 SEP	BDL	BDL	BDL			
1992 DEC	BDL	BDL	BDL			
ETHYLBENZENE (UG/L)						
	BDL	BDL	DET'N LIMIT = 0.05	GUIDELINE = 2.4 (A3)		
1991 JAN	.100 <T	.100 <T	.100 <T			
1991 MAR	BDL	BDL	.050 <T		BDL	
1991 MAY	.150 <T	.050 <T	.100 <T		BDL	
1991 JUL	BDL	.100 <T	.150 <T		.100 <T	
1991 SEP	BDL	.050 <T	.100 <T			
1991 NOV	.100 <T	.100 <T	.100 <T		BDL	
1992 MAR	.100 <T	.100 <T	.150 <T		.100 <T	
1992 JUN	.100 <T	.100 <T	.100 <T			
1992 SEP	.100 <T	.100 <T	.100 <T			
1992 DEC	.100 <T	.050 <T	.050 <T			
P-XYLENE (UG/L)						
	BDL	BDL	DET'N LIMIT = 0.10	GUIDELINE = 300 (A3*)		
35 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL
M-XYLENE (UG/L)						
	BDL	BDL	DET'N LIMIT = 0.10	GUIDELINE = 300 (A3*)		
1991 JAN	BDL	.100 <T	.100 <T			
1991 MAR	BDL	BDL	BDL		BDL	
1991 MAY	BDL	BDL	BDL		BDL	
1991 JUL	BDL	BDL	BDL		BDL	
1991 SEP	BDL	BDL	BDL			
1991 NOV	BDL	BDL	BDL			
1992 MAR	BDL	BDL	BDL		BDL	
1992 JUN	BDL	BDL	BDL		BDL	
1992 SEP	BDL	BDL	BDL			
1992 DEC	.200 <T	BDL	BDL			

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 LONDON (LAKE HURON) WSS

TREATMENT PLANT RAW	RESERVOIR ARVA	TREATMENT PLANT TREATED	DIST. SYSTEM BROOKSIDE ST FREE FLOW	DIST. SYSTEM BROOKSIDE ST STANDING	DIST. SYSTEM RR#1 GRAND BEND FREE FLOW	DIST. SYSTEM SURREY CT FREE FLOW	DIST. SYSTEM SURREY CT STANDING
VOLATILES							
O-XYLENE (UG/L)			DET'N LIMIT = 0.05				
			GUIDELINE = 300 (A3*)				
1991 JAN	BDL	BDL	.050 <T	-	-	-	-
1991 MAR	BDL	BDL	-	-	BDL	-	-
1991 MAY	BDL	BDL	-	-	BDL	-	-
1991 JUL	BDL	BDL	-	-	BDL	-	-
1991 SEP	BDL	BDL	-	-	BDL	-	-
1991 NOV	BDL	BDL	-	-	BDL	-	-
1992 MAR	BDL	BDL	-	-	BDL	-	-
1992 JUN	BDL	BDL	-	-	BDL	-	-
1992 SEP	BDL	BDL	-	-	BDL	-	-
1992 DEC	BDL	BDL	-	-	BDL	-	-
STYRENE (UG/L)			DET'N LIMIT = 0.05				
			GUIDELINE = 100 (D1)				
1991 JAN	BDL	BDL	-	-	-	-	-
1991 MAR	BDL	BDL	-	-	BDL	-	-
1991 MAY	BDL	BDL	-	-	.050 <T	-	-
1991 JUL	BDL	BDL	-	-	.100 <T	-	-
1991 SEP	BDL	BDL	-	-	-	-	-
1991 NOV	BDL	BDL	-	-	-	-	-
1992 MAR	BDL	BDL	-	-	-	-	-
1992 JUN	BDL	BDL	-	-	-	-	-
1992 SEP	BDL	BDL	-	-	-	-	-
1992 DEC	BDL	BDL	-	-	-	-	-
1,1-DICHLOROETHYLENE (UG/L)			DET'N LIMIT = 0.100				
			GUIDELINE = 7 (D1)				
35 SAMPLES	BDL	BDL	BDL	-	BDL	-	-
METHYLENE CHLORIDE (UG/L)			DET'N LIMIT = 0.50				
			GUIDELINE = 50 (A1)				
1991 JAN	BDL	BDL	-	-	-	-	-
1991 MAR	BDL	BDL	-	-	-	-	-
1991 MAY	BDL	BDL	-	-	-	-	-
1991 JUL	BDL	BDL	-	-	-	-	-
1991 SEP	BDL	BDL	-	-	-	-	-
1991 NOV	BDL	BDL	-	-	-	-	-
1992 MAR	BDL	BDL	-	-	-	-	-
1992 JUN	BDL	BDL	-	-	-	-	-
1992 SEP	BDL	BDL	-	-	-	-	-
1992 DEC	BDL	BDL	-	-	-	-	-
T12-DICHLOROETHYLENE (UG/L)			DET'N LIMIT = 0.10				
			GUIDELINE = 70 (D1)				
35 SAMPLES	BDL	BDL	BDL	-	BDL	-	-

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 LONDON (LAKE HURON) WSS

TREATMENT PLANT RAW	RESERVOIR ARVA	TREATMENT PLANT TREATED	DIST. SYSTEM FREE FLOW	DIST. SYSTEM BROOKSIDE ST STANDING	DIST. SYSTEM RR#1 GRAND BEND FREE FLOW	DIST. SYSTEM SURREY CT FREE FLOW	DIST. SYSTEM SURREY CT STANDING
VOLATILES							
1,1-DICHLOROETHANE (UG/L)							
35 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	BDL
CHLOROFORM (UG/L)							
1991 JAN	BDL	9,700	8,500	BDL	BDL	BDL	BDL
1991 MAR	BDL	12,300	13,300	BDL	BDL	BDL	BDL
1991 MAY	BDL	25,100	25,200	BDL	BDL	BDL	BDL
1991 JUL	BDL	21,700	18,300	BDL	BDL	BDL	BDL
1991 SEP	BDL	23,800	24,100	BDL	BDL	BDL	BDL
1991 NOV	BDL	16,600	16,100	BDL	BDL	BDL	BDL
1992 MAR	BDL	15,200	11,200	BDL	BDL	BDL	BDL
1992 JUN	BDL	17,500	8,100	BDL	BDL	BDL	BDL
1992 SEP	BDL	18,900	15,100	BDL	BDL	BDL	BDL
1992 DEC	BDL		11,600	BDL	BDL	BDL	BDL
GUIDELINE = N/A							
1,1,1-TRICHLOROETHANE (UG/L)							
1991 JAN	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1991 MAR	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1991 MAY	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1991 JUL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1991 SEP	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1991 NOV	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1992 MAR	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1992 JUN	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1992 SEP	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1992 DEC	BDL	BDL	BDL	BDL	BDL	BDL	BDL
GUIDELINE = 200 (01)							
1,2-DICHLOROETHANE (UG/L)							
1991 JAN	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1991 MAR	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1991 MAY	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1991 JUL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1991 SEP	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1991 NOV	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1992 MAR	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1992 JUN	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1992 SEP	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1992 DEC	BDL	BDL	BDL	BDL	BDL	BDL	BDL
GUIDELINE = 5 (A1)							
CARBON TETRACHLORIDE (UG/L)							
1991 JAN	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1991 MAR	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1991 MAY	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1991 JUL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1991 SEP	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1991 NOV	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1992 MAR	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1992 JUN	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1992 SEP	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1992 DEC	BDL	BDL	BDL	BDL	BDL	BDL	BDL
GUIDELINE = 5 (A1)							

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 LONDON (LAKE HURON) WSS

TREATMENT PLANT RAW	RESERVOIR ARVA	TREATMENT PLANT TREATED	DIST. SYSTEM BROOKSIDE ST FREE FLOW	DIST. SYSTEM BROOKSIDE ST STANDING	DIST. SYSTEM RR#1 GRAND BEND FREE FLOW	DIST. SYSTEM SURREY CT STANDING
VOLATILES						
1,2-DICHLOROPROPANE (UG/L)						
35 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL
			DET'N LIMIT = 0.05			
			GUIDELINE = 5 (D1)			
TRICHLOROETHYLENE (UG/L)						
35 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL
			DET'N LIMIT = 0.10			
			GUIDELINE = 50 (A1)			
DICHLOROBROMOMETHANE (UG/L)						
35 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL
			DET'N LIMIT = 0.05			
			GUIDELINE = 350 (A1+)			
1991 JAN	BDL	6.850	6.550 SPS	-	-	-
1991 MAR	BDL	7.800	8.300	-	3.350	-
1991 MAY	BDL	8.750	8.750	-	4.200	-
1991 JUL	BDL	8.950	8.700	-	5.250	-
1991 SEP	BDL	9.600	10.200	-	-	-
1991 NOV	BDL	8.200	8.300	-	-	-
1992 MAR	BDL	8.500	7.850	5.300	-	8.600
1992 JUN	BDL	9.450	6.550	-	-	6.300
1992 SEP	BDL	8.600	7.950	-	-	-
1992 DEC	BDL	-	8.250	-	-	-
112-TRICHLOROETHANE (UG/L)						
35 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL
			DET'N LIMIT = 0.05			
			GUIDELINE = 0.6 (D4)			
CHLORO Dibromomethane (UG/L)						
35 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL
			DET'N LIMIT = 0.10			
			GUIDELINE = 350 (A1+)			
1991 JAN	BDL	3.600	4.000	-	-	-
1991 MAR	BDL	3.400	2.900	-	1.800	-
1991 MAY	BDL	2.900	3.300	-	2.600	-
1991 JUL	BDL	2.800	3.100	-	1.800	-
1991 SEP	BDL	4.100	4.400	-	-	-
1991 NOV	BDL	3.400	3.100	2.400	-	1.100
1992 MAR	BDL	3.400	3.900	-	-	2.600
1992 JUN	BDL	3.700	3.800	-	-	-
1992 SEP	BDL	3.300	3.700	-	-	-
1992 DEC	BDL	-	4.600	-	-	-
TETRACHLOROETHYLENE (UG/L)						
35 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL
			DET'N LIMIT = 0.05			
			GUIDELINE = 65 (A5)			

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 LONDON (LAKE HURON) WSS

TREATMENT PLANT RAW	RESERVOIR ARVA	TREATMENT PLANT TREATED	DIST. SYSTEM FREE FLOW	DIST. SYSTEM BROOKSIDE ST STANDING	DIST. SYSTEM RW#1 GRAND BEND FREE FLOW	DIST. SYSTEM SURREY CT FREE FLOW	DIST. SYSTEM SURREY CT STANDING
VOLATILES							
BROMOFORM (UG/L)			DET'N LIMIT = 0.20	GUIDELINE = 350 (A1++)			
1991 JAN	BDL	BDL	BDL				
1991 MAR	BDL	.200 <T	.200 <T		.200 <T		
1991 MAY	BDL	.200 <T	.200 <T		BDL		
1991 JUL	BDL	BDL	BDL		BDL		
1991 SEP	BDL	BDL	BDL			BDL	
1991 NOV	BDL	BDL	BDL			BDL	
1992 MAR	BDL	BDL	BDL			BDL	
1992 JUN	BDL	BDL	BDL				
1992 SEP	BDL	BDL	BDL				
1992 DEC	BDL	.600 <T	.600 <T				
1122-TETRACHLOROETHANE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 0.17 (D4)			
35 SAMPLES	BDL	BDL	BDL		BDL		
VINYL CHLORIDE (UG/L)			DET'N LIMIT = 0.100	GUIDELINE = 2 (D1)			
11 SAMPLES	BDL	BDL	BDL				
C12-DICHLOROETHYLENE (UG/L)			DET'N LIMIT = 0.100	GUIDELINE = 70 (D1)			
11 SAMPLES	BDL	BDL	BDL				
CHLOROBENZENE (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = 1510 (D3)			
35 SAMPLES	BDL	BDL	BDL		BDL		
1,4-DICHLOROBENZENE (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = 5 (A1)			
35 SAMPLES	BDL	BDL	BDL		BDL		
1,3-DICHLOROBENZENE (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = 3750 (D3)			
35 SAMPLES	BDL	BDL	BDL		BDL		
1,2-DICHLOROBENZENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 200 (A1)			
35 SAMPLES	BDL	BDL	BDL		BDL		
ETHYLENE DIBROMIDE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 50 (D1)			
35 SAMPLES	BDL	BDL	BDL		BDL		

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 LONDON (LAKE HURON) WSS

TREATMENT PLANT RAW	RESERVOIR ARVA	TREATMENT PLANT TREATED	DIST. SYSTEM BROOKSIDE ST		DIST. SYSTEM BROOKSIDE ST STANDING	DIST. SYSTEM RR#1 GRAND BEND		DIST. SYSTEM SURREY CT		
			FREE FLOW	STANDING		FREE FLOW	STANDING	FREE FLOW	STANDING	
VOLATILES			GUIDELINE = 350 (A1)							
TOTL TRIHALOMETHANES (UG/L)			DET'N LIMIT = 0.50							
1991 JAN	BDL	20.200								
1991 MAR	BDL	23.750					9.900			
1991 MAY	BDL	37.500					14.550			
1991 JUL	BDL	36.950					16.650			
1991 SEP	BDL	33.450						28.500		
1991 NOV	BDL	37.500						20.400		
1991 DEC	BDL	28.200								
1992 JAN	BDL	27.100								
1992 FEB	BDL	22.950								
1992 MAR	BDL	30.650								
1992 APR	BDL	30.800								
1992 MAY	BDL	25.050								

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 LONDON (LAKE HURON) WSS

TREATMENT PLANT RAW	RESERVOIR ARVA	TREATMENT PLANT TREATED	DIST. SYSTEM BROOKSIDE ST FREE FLOW	DIST. SYSTEM BROOKSIDE ST STANDING	DIST. SYSTEM RR#1 GRAND BEND FREE FLOW	DIST. SYSTEM SURREY CT FREE FLOW	DIST. SYSTEM SURREY CT STANDING
RADIONUCLIDES							
COBALT 60 (BQ/L)		DET'N LIMIT = 0.70		GUIDELINE = N/A			
5 SAMPLES	BDL	BDL					
CESIUM 134 (BQ/L)		DET'N LIMIT = 0.70		GUIDELINE = N/A			
5 SAMPLES	BDL	BDL					
CESIUM 137 (BQ/L)		DET'N LIMIT = 0.70		GUIDELINE = 50 (A1)			
5 SAMPLES	BDL	BDL					
GROSS ALPHA COUNT (BQ/L)		DET'N LIMIT = 0.04		GUIDELINE = 0.55 (D1)			
5 SAMPLES	BDL	BDL					
GROSS BETA COUNT (BQ/L)		DET'N LIMIT = 0.04		GUIDELINE = N/A			
1991 NOV	.070	.060					
1992 JUN	.060	.070					
TRITIUM (BQ/L)		DET'N LIMIT = 7.00		GUIDELINE = 40000 (A1)			
1991 NOV	9,000	9,000					
1992 JUN	10,000	6,000					
100 IONE 131 (BQ/L)		DET'N LIMIT = 0.70		GUIDELINE = 10 (A1)			
5 SAMPLES	BDL	BDL					

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
BACTERIOLOGICAL			
FECAL COLIFORM MEMBRANE FILTRATION	CT/100ML	0	0 (A1)
STANDARD PLATE COUNT MEMBRANE FILT.	CT/ML	0	500/ML (A3)
TOTAL COLIFORM BACKGROUND MF	CT/100ML	0	N/A
TOTAL COLIFORM MEMBRANE FILTRATION	CT/100ML	0	5/100ML (A1)
CHEMISTRY (FLD)			
FIELD COMBINED CHLORINE RESIDUAL	MG/L	0	N/A
FIELD TOTAL CHLORINE RESIDUAL	MG/L	0	N/A
FIELD FREE CHLORINE RESIDUAL	MG/L	0	N/A
FIELD PH	DMNSLESS	N/A	6.5-8.5 (A4)
FIELD TEMPERATURE	DEG.C	N/A	15.0 (A3)
FIELD TURBIDITY	FTU	N/A	1.0 (A1)
CHEMISTRY (LAB)			
ALKALINITY	MG/L	0.20	30-500 (A4)
AMMONIUM TOTAL	MG/L	0.002	0.05 (F2)
CALCIUM	MG/L	0.20	100.0 (F2)
CHLORIDE	MG/L	0.20	250.0 (A3)
COLOUR	TCU	0.50	5.0 (A3)
CONDUCTIVITY	UMHO/CM	1.00	400.0 (F2)
CYANIDE	MG/L	0.001	0.2 (A1)
DISSOLVED ORGANIC CARBON	MG/L	0.10	5.0 (A3)
FLUORIDE	MG/L	0.01	1.5* (A1)
HARDNESS	MG/L	0.50	80-100 (A4)
IONCAL	DMNSLESS	N/A	N/A
LANGELIERS INDEX	DMNSLESS	N/A	N/A
MAGNESIUM	MG/L	0.10	30.0 (F2)
NITRATES (TOTAL)	MG/L	0.005	10.0 (A1)
NITRITE	MG/L	0.001	1.0 (A1)
NITROGEN TOTAL KJELDAHL	MG/L	0.02	N/A
PH	DMNSLESS	N/A	6.5-8.5 (A4)
PHOSPHORUS FIL REACT	MG/L	0.0005	N/A
PHOSPHORUS TOTAL	MG/L	0.002	0.4 (F2)
POTASSIUM	MG/L	0.010	10.0 (F2)
RESIDUE FILTRATE (CALCULATED TDS)	MG/L	N/A	500.0 (A3)
SODIUM	MG/L	0.20	200.0 (A4)
SULPHATE	MG/L	0.20	500.0 (A4)
TURBIDITY	FTU	0.05	1.0 (A1)
* The Maximum Acceptable Concentration (MAC) for <u>naturally occurring fluoride</u> in drinking water is 2.4 mg/L.			
CHLOROAROMATICS			
1,2,3-TRICHLOROBENZENE	NG/L	5.0	N/A
1,2,3,4-TETRACHLOROBENZENE	NG/L	1.0	N/A
1,2,3,5-TETRACHLOROBENZENE	NG/L	1.0	N/A
1,2,4-TRICHLOROBENZENE	NG/L	5.0	10000 (1)
1,2,4,5-TETRACHLOROBENZENE	NG/L	1.0	38000 (D4)
1,3,5-TRICHLOROBENZENE	NG/L	5.0	N/A
2,3,6-TRICHLOROTOLUENE	NG/L	5.0	N/A
2,4,5-TRICHLOROTOLUENE	NG/L	5.0	N/A
2,6A-TRICHLOROTOLUENE	NG/L	5.0	N/A
HEXACHLOROBENZENE (HCB)	NG/L	1.0	10 (C1)
HEXACHLOROBUTADIENE	NG/L	1.0	450 (D4)
HEXACHLOROETHANE	NG/L	1.0	1900 (D4)
OCTACHLOROSTYRENE	NG/L	1.0	N/A
PENTACHLOROBENZENE	NG/L	1.0	74000 (D4)
CHLOROPHENOLS			
2,3,4-TRICHLOROPHENOL	NG/L	100.0	N/A
2,3,4,5-TETRACHLOROPHENOL	NG/L	20.0	N/A
2,3,5,6-TETRACHLOROPHENOL	NG/L	10.0	N/A

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
2,4,5-TRICHLOROPHENOL	NG/L	100.0	2600000 (D4)
2,4,6-TRICHLOROPHENOL	NG/L	20.0	5000 (A1)
PENTACHLOROPHENOL	NG/L	10.0	60000 (A1)
METALS			
ALUMINUM	UG/L	0.10	100 (A4)
ANTIMONY	UG/L	0.05	146 (D4)
ARSENIC	UG/L	0.10	25 (A1)
BARIUM	UG/L	0.05	1000 (A2)
BERYLLIUM	UG/L	0.05	6800 (D4)
BORON	UG/L	2.00	5000 (A1)
CADMIUM	UG/L	0.05	5 (A1)
CHROMIUM	UG/L	0.50	50 (A1)
COBALT	UG/L	0.02	N/A
COPPER	UG/L	0.50	1000 (A3)
IRON	UG/L	6.00	300 (A3)
LEAD	UG/L	0.05	10 (A1)
MANGANESE	UG/L	0.05	50 (A3)
MERCURY	UG/L	0.02	1 (A1)
MOLYBDENUM	UG/L	0.05	N/A
NICKEL	UG/L	0.20	350 (D3)
SELENIUM	UG/L	1.00	10 (A1)
SILVER	UG/L	0.05	N/A
STRONTIUM	UG/L	0.10	N/A
THALLIUM	UG/L	0.05	13 (D4)
TITANIUM	UG/L	0.50	N/A
URANIUM	UG/L	0.05	100 (A1)
VANADIUM	UG/L	0.05	N/A
ZINC	UG/L	0.20	5000 (A3)
POLYNUCLEAR AROMATIC HYDROCARBONS			
ANTHRACENE	NG/L	1.0	N/A
BENZO(A) ANTHRACENE	NG/L	20.0	N/A
BENZO(A) PYRENE	NG/L	5.0	10 (A1)
BENZO(B) CHRYSENE	NG/L	2.0	N/A
BENZO(B) FLUORANTHENE	NG/L	10.0	N/A
BENZO(E) PYRENE	NG/L	50.0	N/A
BENZO(G,H,I) PERYLENE	NG/L	20.0	N/A
BENZO(K) FLUORANTHENE	NG/L	1.0	N/A
CHRYSENE	NG/L	50.0	N/A
CORONENE	NG/L	10.0	N/A
DIBENZO(A,H) ANTHRACENE	NG/L	10.0	N/A
DIMETHYL BENZO(A) ANTHRACENE	NG/L	5.0	N/A
FLUORANTHENE	NG/L	20.0	42000 (D4)
INDENO(1,2,3-C,D) PYRENE	NG/L	20.0	N/A
PERYLENE	NG/L	10.0	N/A
PHENANTHRENE	NG/L	10.0	N/A
PYRENE	NG/L	20.0	N/A
PESTICIDES & PCB			
ALACHLOR (LASSO)	NG/L	500.0	5000 (A2)
ALDRIN	NG/L	1.0	700 (A1)
ALPHA HEXACHLOROCYCLOHEXANE (BHC)	NG/L	1.0	700 (G)
ALPHA CHLORDANE	NG/L	2.0	7000 (A1)
AMETRINE	NG/L	50.0	300000 (D3)
ATRATONE	NG/L	50.0	N/A
ATRAZINE	NG/L	50.0	60000 (A2)
DESETHYL ATRAZINE	NG/L	200.0	60000 (A2)
BETA HEXACHLOROCYCLOHEXANE (BHC)	NG/L	1.0	300 (G)
CYANAZINE (BLADAX)	NG/L	100.0	10000 (A2)
DIELDRIN	NG/L	2.0	700 (A1)
ENDOSULFAN 1 (THIODAN I)	NG/L	2.0	74000 (D4)
ENDOSULFAN 2 (THIODAN II)	NG/L	5.0	74000 (D4)
ENDOSULFAN SULPHATE (THIODAN SULPHATE)	NG/L	5.0	N/A

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
ENDRIN	NG/L	5.0	1600 (D3)
GAMMA CHLORDANE	NG/L	2.0	7000 (A1)
HEPTACHLOR	NG/L	1.0	3000 (A1)
HEPTACHLOR EPOXIDE	NG/L	1.0	3000 (A1)
HEXACHLOROCYCLOPENTADIENE	NG/L	5.0	206000 (D4)
LINDANE (GAMMA BHC)	NG/L	1.0	4000 (A1)
METHOXYCHLOR	NG/L	5.0	900000 (A1)
METOLACHLOR	NG/L	500.0	50000 (A2)
METRIBUZIN (SENCOR)	NG/L	100.0	80000 (A1)
MIREX	NG/L	5.0	N/A
P,P-DDD	NG/L	5.0	30000 (A1)
O,P-DDT	NG/L	5.0	30000 (A1)
P,P-DDT	NG/L	5.0	30000 (A1)
P,P-ODE	NG/L	1.0	30000 (A1)
OXYCHLORDANE	NG/L	2.0	N/A
PCB	NG/L	20.0	3000 (A2)
PROMETONE	NG/L	50.0	52500 (D3)
PROMETRYNE	NG/L	50.0	1000 (A2)
PROPAZINE	NG/L	50.0	700000 (D3)
SIMAZINE	NG/L	50.0	10000 (A2)
DESETHYL SIMAZINE	NG/L	200.0	10000 (A2)
TOXAPHENE	NG/L	500.0	5000 (A1)
PHENOLICS			
PHENOLICS (UNFILTERED REACTIVE)	UG/L	0.2	N/A
SPECIFIC PESTICIDES			
2,4 D PROPIONIC ACID	NG/L	100.0	N/A
2,4,5-TRICHLOROPHENOXY ACETIC ACID	NG/L	50.0	280000 (A1)
2,4-DICHLOROBUTYRIC ACID (2,4-D)	NG/L	100.0	100000 (A1)
2,4-DICHLOROPHENOXYBUTYRIC ACID (2,4-DB)	NG/L	200.0	N/A
2,4,5-TP (SILVEX)	NG/L	20.0	10000 (A1)
BUTYLATE (SUTAN)	NG/L	2000.0	245000 (D3)
CARBARYL (SEVIN)	NG/L	200.0	90000 (A1)
CARBOFURAN	NG/L	2000.0	90000 (A1)
CHLORPROPHAM (CIPC)	NG/L	2000.0	350000 (G)
CHLORPYRIFOS (DURSBAN)	NG/L	20.0	N/A
DIALLATE	NG/L	2000.0	N/A
DIAZINON	NG/L	20.0	20000 (A1)
DICAMBA	NG/L	50.0	120000 (A1)
DICHLOROVOS	NG/L	20.0	N/A
EPTAM	NG/L	2000.0	N/A
ETHION	NG/L	20.0	35000 (G)
IPC	NG/L	2000.0	N/A
MALATHION	NG/L	20.0	190000 (A1)
METHYL PARATHION	NG/L	50.0	9000 (D3)
METHYLTRITHION	NG/L	20.0	N/A
MEVINPHOS	NG/L	20.0	N/A
PARATHION	NG/L	20.0	50000 (A1)
PHORATE (THIMET)	NG/L	20.0	2000 (A2)
PICHLORAM	NG/L	100.0	190000 (A2)
PROPOXUR (BAYGON)	NG/L	2000.0	140000 (D3)
RELDAN	NG/L	20.0	N/A
RONNEL	NG/L	20.0	N/A
VOLATILES			
1,1-DICHLOROETHANE	UG/L	0.10	N/A
1,1-DICHLOROETHYLENE	UG/L	0.10	7 (D1)
1,2-DICHLOROBENZENE	UG/L	0.05	200 (A1)
1,2-DICHLOROETHANE	UG/L	0.05	5 (A1)
1,2-DICHLOROPROPANE	UG/L	0.05	5 (D1)
1,3-DICHLOROBENZENE	UG/L	0.10	3750 (D3)
1,4-DICHLOROBENZENE	UG/L	0.10	5 (A1)
1,1,1-TRICHLOROETHANE	UG/L	0.02	200 (D1)
1,1,2-TRICHLOROETHANE	UG/L	0.05	0.6 (D4)
1,1,2,2-TETRACHLOROETHANE	UG/L	0.05	0.17 (D4)

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
BENZENE	UG/L	0.05	5 (A1)
BROMOFORM	UG/L	0.20	350 (A1+)
CARBON TETRACHLORIDE	UG/L	0.20	5 (A1)
CHLOROBENZENE	UG/L	0.10	1510 (D3)
CHLORO Dibromomethane	UG/L	0.10	350 (A1+)
CHLOROFORM	UG/L	0.10	350 (A1+)
CIS 1,2-DICHLOROETHYLENE	UG/L	0.10	70 (D1)
DICHLOROBROMOMETHANE	UG/L	0.05	350 (A1+)
ETHYLENE DIBROMIDE	UG/L	0.05	50 (D1)
ETHYLBENZENE	UG/L	0.05	2.4 (A3)
M-XYLENE	UG/L	0.10	300 (A3*)
METHYLENE CHLORIDE	UG/L	0.50	50 (A1)
O-XYLENE	UG/L	0.05	300 (A3*)
P-XYLENE	UG/L	0.10	300 (A3*)
STYRENE	UG/L	0.05	100 (D1)
TETRACHLOROETHYLENE	UG/L	0.05	65 (A5)
TRANS 1,2-DICHLOROETHYLENE	UG/L	0.10	70 (D1)
TOLUENE	UG/L	0.05	24 (A3)
TOTAL TRIHALOMETHANES	UG/L	0.50	350 (A1)
TRICHLOROETHYLENE	UG/L	0.10	50 (A1)
VINYL CHLORIDE	UG/L	0.10	2 (D1)
RADIONUCLIDES			
TRITIUM	BQ/L	7.0	40000 (A1)
GROSS ALPHA COUNT	BQ/L	0.04	0.55# (D1)
GROSS BETA COUNT	BQ/L	0.04	N/A
COBALT 60	BQ/L	0.70	N/A
CESIUM 134	BQ/L	0.70	N/A
CESIUM 137	BQ/L	0.70	50 (A1)
IODINE 131	BQ/L	0.70	10 (A1)

Equal to 15.0 Picocuries/litre

DRINKING WATER SURVEILLANCE PROGRAM
PROGRAM DESCRIPTION

The Drinking Water Surveillance Program (DWSP) for Ontario monitors drinking water quality at municipal water supply systems. The DWSP Database Management System provides a computerized drinking water quality information system for the supplies monitored. The objectives of the program are to provide:

- immediate, reliable, current information on drinking water quality;
- a flagging mechanism for guideline exceedance;
- a definition of contaminant levels and trends;
- a comprehensive background for remedial action;
- a framework for assessment of new contaminants; and
- an indication of treatment efficiency of plant processes.

PROGRAM

The DWSP officially began in April 1986 and is designed to eventually include all municipal water supplies in Ontario. In 1992, 109 systems were being monitored. Water supply locations have been prioritized for surveillance based primarily on criteria such as population density, probability of contamination and geographical location.

An ongoing assessment of future monitoring requirements at each location will be made. Monitoring will continue at the initial locations at an appropriate level and further locations will be phased into the program as resources permit.

A major goal of the program is to collect valid water quality data in context with plant operational characteristics at the time of sampling. As soon as sufficient data have been accumulated and analyzed, both the frequency of sampling and the range of parameters may be adjusted accordingly.

Assessments are carried out at all locations prior to initial sampling, in order to acquire complete plant process and distribution system details and to designate (and retrofit if necessary) all sampling systems and locations. This ensures that the sampled water is a reflection of the water itself.

Samples are taken of raw (ambient water) and treated water at the treatment plant and of consumer's tap water in the distribution system. In order to determine possible effects of distribution on water quality, both standing and free flow water in old and new sections of the distribution system are sampled. Sampling is carried out by operational personnel who have been trained in applicable procedures.

Comprehensive standardized procedures and field test kits are supplied to sampling personnel. This ensures that samples are taken and handled according to standard protocols and that field testing will supply reliable data. All field and laboratory analyses are carried out using "approved documented procedures". Most laboratory analyses are carried out by the Ministry of Environment and Energy (MOEE), Laboratory Services Branch. Radionuclides are analyzed by the Ministry of Labour.

DATA REPORTING MECHANISM

When the analytical results are transferred from the MOEE laboratory into the DWSP system, printouts of the completed analyses are sent to the MOEE District Officer, the appropriate operational staff and are also retained by the DWSP unit.

PROGRAM INPUTS AND OUTPUTS

There are four major inputs and four major outputs in the program.

Program Input - Plant and Distribution System Description

The system description includes plant specific non-analytical information acquired through a questionnaire and an initial plant visit. During the initial assessment of the plant and distribution system, questionnaire content is verified and missing information added. It is intended that all data be kept current with scheduled annual updates.

The Plant and Distribution System Description consists of the following seven components:

1. PROCESS COMPONENT INVENTORY

All physical and chemical processes to which the water is subjected, from the intake pipe to the consumers' tap (where possible), are documented. These include: process type, general description of physical structures, material types, sizes, and retention time for each process within the plant. The processes may be as simple as transmission or as complex as carbon adsorption.

2. TREATMENT CHEMICALS

Chemicals used in the treatment processes, their function, application point, supplier and brand-name are recorded. Chemical dosages applied on the day of sampling are recorded in DWSP.

3. PROCESS CONTROL MEASUREMENTS

Documentation of in-plant monitoring of process parameters (eg. turbidity, chlorine residuals, pH, aluminum residuals) including methods used, monitoring locations and frequency is contained in this section. Except for the recorded Field Data, in-plant monitoring results are not retained in DWSP but are retained by the water treatment plant personnel.

4. DESIGN FLOW AND RETENTION TIME

Hydraulic capacity, designed and actual, is noted here. Retention time (the time that a block of water is retained in the plant) is also noted. Maximum, minimum and average flow, as well as a record of the flow rate on the day of sampling, are recorded in DWSP.

5. DISTRIBUTION SYSTEM DESCRIPTION

This area includes the storage and transmission characteristics of the distribution system after the water leaves the plant.

6. SAMPLING SYSTEM

Each plant is assessed for its adequacy in terms of the sampling of bacteriological, organic and inorganic parameters. Prime considerations in the assessment and design of the sampling system are:

- i/ the sample is an accurate representation of the actual water condition, eg. raw water has had no chemical treatment;
- ii/ the water being sampled is not being modified by the sampling system;
- iii/ the sample tap must be in a clean area of the plant, preferably a lab area; and
- iv/ the sample lines must be organically inert (no plastic, ideally stainless steel).

It is imperative that the sampled water be a reflection not of the sampling system but of the water itself.

The sampling system documentation includes: origin of the water; date sampling was initiated; size, length and material type (intake, discharge and tap); pump characteristics (model, type, capacity); and flow rate.

7. PERSONNEL

This section contains the names, addresses and phone numbers of current plant management and operational staff, distribution system management and operational staff, Medical Officer of Health and appropriate MOEE personnel associated with the plant.

Program Input - Field Data

The second major input to DWSP is field data. Field data is collected at the plant and from the distribution system sites on the day of sampling. Field data consists of general operating conditions and the results of testing for field parameters. General operating conditions include chemicals used, dosages, flow and retention time on the day of sampling, as well as, monthly maximum, minimum and average flows. Field parameters include turbidity, chlorine residuals (free, combined and total), temperature and pH. These parameters are analyzed according to standardized DWSP protocols to allow for interplant comparison.

Program Input - Laboratory Analytical Data

The third major input to DWSP is Laboratory Analytical Data. Samples gathered from the raw, treated and distribution sampling sites are analyzed for the presence of approximately 180 parameters at a frequency of two to twelve times per year. Sixty-five percent of the parameters are organic. Parameters measured may have health or aesthetic implications when present in drinking water. Many of the parameters may be used in the treatment process or may be treatment by-products. Due to the nature of certain analytical instruments, parameters may be measured in a "scan" producing some results for parameters that are not on the DWSP priority list, but which may be of interest. The majority of parameters are measured on a routine basis. Those that are technically more difficult and/or costly to analyze, however, are done less frequently. These include Specific Pesticides and Chlorophenols.

Although the parameter list is extensive, additional parameters with the potential to cause health or aesthetic related problems may be added provided reliable analytical and sampling methods exist.

All laboratory generated data is derived from standardized, documented analytical protocols. The analytical method is an integral part of the data and as methods change, notation will be made and comparison data documented.

Program Input - Parameter Reference Information

The fourth major input to DWSP is Parameter Reference Information. This is a catalogue of information for each substance analyzed on DWSP. It includes parameter name and aliases, physical and chemical properties, basic toxicology, world-wide health limits, treatment methods and uses. The Parameter Reference Information is computerized and can be accessed through the Query function of the DWSP database. An example is shown in figure 1.

Program output - Query

All DWSP information is easily accessed through the Query function, therefore, anything from addresses of plant personnel to complete water quality information for a plant's water supply is instantly available. The DWSP computer system makes relatively complex inquiries manageable. A personal password allowing access into the DWSP query mode in all MOEE offices is being developed by the DWSP group.

Program Output - Action Alerts

Drinking Water quality in Ontario is evaluated against provincial objectives as outlined in the Ontario Drinking Water Objectives publication. Should the reported level of a substance in treated water exceed the Ontario Drinking Water Objective, an "Action Alert" requiring resampling and confirmation is issued. This assures that operational staff, health authorities and the public are notified as soon as possible of the confirmation of an exceedance and remedial action taken. This report supplies a history of the occurrence of past exceedances at the plant plus a historical summary on the parameter of concern.

In the absence of Ontario Drinking Water Objectives, guidelines/limits from other agencies are used. The Parameter Listing System, published by MOEE (ISBN 0-7729-4461-X), catalogues and keeps current guidelines for 650 parameters from agencies throughout the world. If these guidelines are exceeded, the results are flagged and evaluated by DWSP personnel. An "Action Alert" will be issued if warranted.

Program Output - Report Generation

Custom reports can be generated from DWSP to meet MOEE Regional needs and to respond to public requests.

Program Output - Annual Reports

It is the practice of DWSP to produce an annual report containing analytical data along with companion plant information.

FIG.1

PARAMETER REFERENCE INFORMATION

NAME: BENZENE

CAS#: 71-43-2

MOLECULAR FORMULAE: C_6H_6

DETECTION LIMIT: (FOR METHOD POCODO) 0.05 $\mu g/L$

SYNONYMS: BENZOL; BENZOLE; COAL NAPHTHA; CARBON OIL (27)
CYCLOHEXATRIENE (41)

CHARACTERISTICS: COLOURLESS TO LIGHT-YELLOW, MOBILE, NONPOLAR LIQUID, OF
HIGHLY REFRACTIVE NATURE, AROMATIC ODOUR; VAPOURS BURN
WITH SMOKING FLAME (30)

PROPERTIES: SOLUBILITY IN WATER: 1780-1800 mg/L AT 25C (41)
THRESHOLD ODOUR: 0.5 - 10 PPM IN WATER
THRESHOLD TASTE: 0.5 mg/L IN WATER (39)
ENVIRONMENTAL FATE: MAY BIOACCUMULATE IN LIVING ORGANISMS
AND APPEARS TO ACCUMULATE IN ANIMAL TISSUES THAT EXHIBIT
A HIGH LIPID CONTENT OR REPRESENT MAJOR METABOLIC SITES,
SUCH AS LIVER OR BRAIN; SMALL QUANTITIES EVAPORATE FROM
SOILS OR ARE DEGRADED RATHER QUICKLY (80)

SOURCES: COMMERCIAL: PETROLEUM REFINING; SOLVENT RECOVERY; COAL TAR
DISTILLATION (39); FOOD PROCESSING AND TANNING INDUSTRIES;
COMBUSTION OF CAR EXHAUST.
ENVIRONMENTAL: POSSIBLE SOURCE IS RUNOFF.

USES: DETERGENTS; NYLON; INTERMEDIATE IN PRODUCTION OF OTHER
COMPOUNDS, SUCH AS PESTICIDES; SOLVENT FOR EXTRACTION AND
RECTIFICATION IN RUBBER INDUSTRY; DEGREASING AND CLEANSING
AGENT; GASOLINE.

REMOVAL: THE FOLLOWING PROCESSES HAVE BEEN SUCCESSFUL IN REMOVING
BENZENE FROM WASTEWATER: GAC ADSORPTION, PRECIPITATION
WITH ALUM AND SUBSEQUENT REMOVAL VIA SEDIMENTATION,
COAGULATION AND FLOCCULATION, SOLVENT EXTRACTION,
OXIDATION

ADDITIONAL PROPERTIES: MOLECULAR WEIGHT: 78.12
MELTING POINT: 5.5°C (27)
BOILING POINT: 80.1°C (27)
SPECIFIC GRAVITY: 0.8790 AT 20°C (27)
VAPOUR PRESSURE: 100 MM AT 26.1°C (27)
HENRY'S LAW CONSTANT: 0.00555 ATM-M3/MOLE (41)
LOG OCT./WATER PARTITION COEFFICIENT: 1.95 TO 2.13 (39)
CARBON ADSORPTION: K=1.0; 1/N=1.6; R=0.97; PH=5.3 (41)
SEDIMENT/WATER PARTITION COEFFICIENT: NO DATA

DWSP SAMPLING GUIDELINE

i) Raw and Treated at Plant

General Chemistry	<ul style="list-style-type: none"> -500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
Bacteriological	<ul style="list-style-type: none"> -220 mL plastic bottle with white seal on cap -do <u>not</u> rinse bottle, preservative has been added -avoid touching bottle neck or inside of cap -fill to top of red label as marked
Metals	<ul style="list-style-type: none"> -500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid (HNO_3) (Caution: HNO_3 is corrosive)
Volatiles (duplicates) (OPOPUP)	<ul style="list-style-type: none"> -45 mL glass vial with septum (teflon side must be in contact with sample) -do <u>not</u> rinse bottle -fill bottle completely without bubbles
Organics (OWOC), (OWTRI)	<ul style="list-style-type: none"> -1 L amber glass bottle per scan -do <u>not</u> rinse bottle -fill to 2 cm from top
Specific Pesticides (OWCP), (PEOP), (PECAR)	<ul style="list-style-type: none"> -as per Organics -three extra bottles must be filled
Polyaromatic hydrocarbons (OAPAHX)	<ul style="list-style-type: none"> -1 L amber glass bottle per scan -do <u>not</u> rinse bottle -fill to 2 cm from top -add 25 drops of sodium thiosulphate
Cyanide (Treated only)	<ul style="list-style-type: none"> -500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops sodium hydroxide (NaOH) (Caution: NaOH is corrosive)
Mercury	<ul style="list-style-type: none"> -250 mL glass bottle -rinse bottle and cap three times -fill to top of label -add 20 drops each nitric acid (HNO_3) and potassium dichromate ($\text{K}_2\text{Cr}_2\text{O}_7$) (Caution: HNO_3 & $\text{K}_2\text{Cr}_2\text{O}_7$ are corrosive)

Phenols	-250 mL glass bottle -do <u>not</u> rinse bottle, preservative has been added -fill to top of label
Radionuclides (as scheduled)	-4 L plastic jug -do <u>not</u> rinse, carrier added -fill to 5 cm from top
Organic Characterization (GC/MS - once per year) (PBVOL), (PBEXT)	-1 L amber glass bottle; instructions as per organic -250 mL glass bottle -do <u>not</u> rinse bottle -fill completely without bubbles

Steps:

1. Let sampling water tap run for an adequate time to clear the sample line.
2. Record time of day on submission sheet.
3. Record temperature on submission sheet.
4. Fill up all bottles as per instructions.
5. Record chlorine residuals (free, combined and total for treated water only), turbidity and pH on submission sheet.
6. No smoking in area of sample location.

ii) Distribution Samples (standing water)

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid (HNO_3) (Caution: HNO_3 is corrosive)

Steps:

1. Record time of day on submission sheet.
2. Place bucket under tap and open cold water.
3. Fill to predetermined volume.
4. After mixing the water, record the temperature on the submission sheet.

5. Fill general chemistry and metals bottles.

6. Record chlorine residuals (free, combined and total), turbidity and pH on submission sheet.

iii) Distribution Samples (free flow)

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
Bacteriological	-250 mL plastic bottle with white seal on cap -do <u>not</u> rinse bottle, preservative has been added -avoid touching bottle neck or inside of cap -fill to top of red label as marked
Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid HNO_3 (Caution: HNO_3 is corrosive)
Volatiles (duplicate) (OPOPU)	-45 mL glass vial with septum (teflon side must be in contact with sample) -do <u>not</u> rinse bottle, preservative has been added -fill bottle completely without bubbles
Organics (OWOC)	-1 L amber glass bottle per scan -do <u>not</u> rinse bottle -fill to 2 cm from top
Polyaromatic Hydrocarbons (OAPAHX)	-1 L amber glass bottle per scan -do <u>not</u> rinse bottle -fill to 2 cm from top -add 25 drops of sodium thiosulphate

Steps:

1. Record time of day on submission sheet.
2. Let cold water flow for five minutes.
3. Record temperature on submission sheet.
4. Fill all bottles as per instructions.
5. Record chlorine residuals (free, combined and total), turbidity and pH on submission sheet.

